CardWare

SL-62 Jingle2 controller / timer

Techincal description

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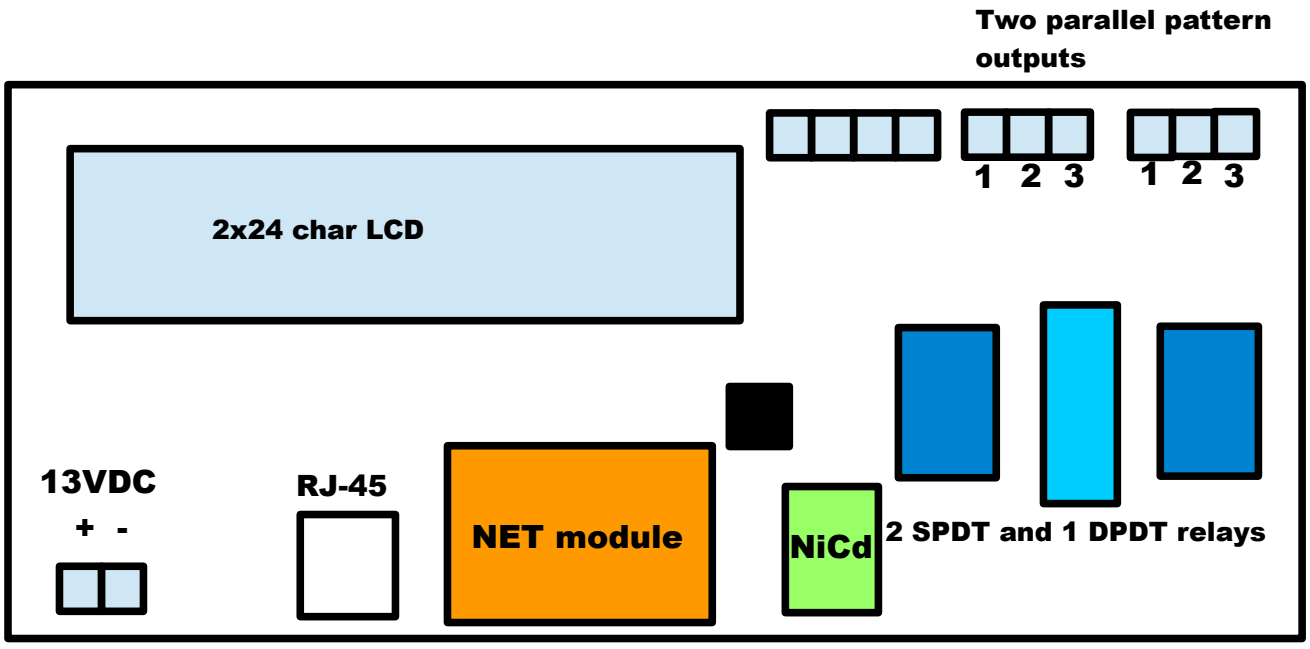
Description

- The SL-62 is a jingle controller for use with Jingle2 units and Jingle2-PS power supplies.
- The Jingle2 system uses 3 wires to transmit the power to Jingle2 units and select one of 4 melodies for the active jingle.
- The SL-62 has a table of up to 32 time events
- Real Time Clock with NiCd battery for timekkeping
- Each time event has the following setup options:
  - Year (last two digits of the year or DON'T CARE)
  - Month (1-12 or DON'T CARE)
  - Day (1-31 or DON'T CARE)
  - Hour (00 – 23 or DON'T CARE)
  - Minute (00-59 or DON'T CARE)
  - Weekdays (Mon to Fri each with selectable checkboxes)
  - Output pattern OFF,1,2,3,4
    - The output is a 3-pin screw terminal and the patterns designate a specific combination and polarity of a 12V signal between the pins marked 1,2 and 3
    - These output patterns select a melody on the Jingle2 units
    - The SL-621 relay module decodes the patterns to switch two relays on and off
  - Output pattern duration in seconds (1..32)
- Inputs
  - 13VDC/2A input
  - RJ45 ethernet LAN connector
  - Two voltage-free inputs (currently not implemented) used as qualifiers for output patterns
- Outputs
  - two parallel-connected 3-pin screw terminals. These are used to connect one of the following:
    - Jingle2 units
    - Jingle2-PS units
    - SL-621 double relay modules that enable the SL-62 to be used as a general purpose timer.
    - Each output is protected by a 0,9A self-healing fuse

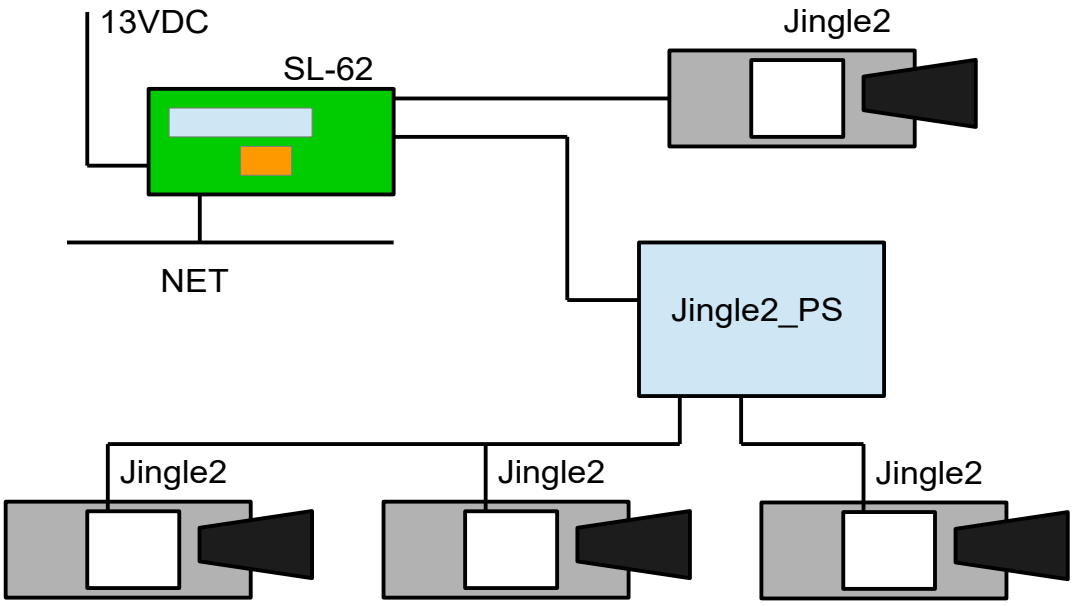
Board layout and contents



- 24 character 2 line LCD is used to show the current date & time in the top row and the currently active time event in the bottom row. The right end of the bottom row shows a number denoting the total number of used time events.
- The two SPDT and one DPDT relays are used to channel a 12VDC signal in one of two polarities to pins 1 and 2 of the screw terminals. By also connecting pin 3 either to pin 1 or pin 2, we get 4 possible combinations and power for the selection of Jingles tunes and setting/resetting the relays on the SL-621
- the orange ethernet module enables direct connection of the SL-62 to a network. The module is a 10MB/s device
- the two 3-pin pattern output screw terminals are in the top right corner of the board. The two connectors are paralleled i.e. their respective pins are connected. This is to allow branching in two directions without having to stuff two wires in the same screw terminal.
- There is a 3,6V NiCd battery to keep the clock chip going in case of a power cut. Note that the SL-62 should not be unpowered for more than a few weeks because time&date will be lost.

Layout example when used as Jingle2 controller

The following illustration shows an example of an SL-62 used for a jingle system using Jingle2 (4 melody) devices:



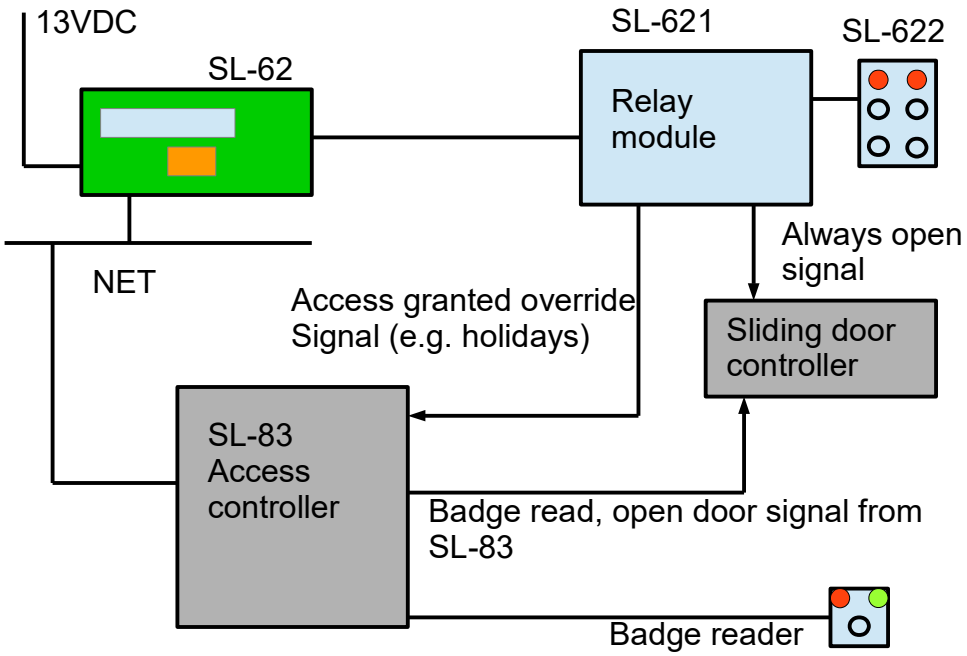
Notes:

- The SL-62 is usually in its own metal case with EMI filter and 220VAC/DC converter but this is not shown in the drawing
- All Jingle2 related cables are 3x0.75mm2 or thicker

Layout example using SL-62 as general purpose timer

This next illustration shows the SL-62 used as a timer which generates signals for turning the two relays of the SL-621 module ON/OFF at predetermined dates and times. Note the SL-622 wal module that is used to show the state of the two SL-621 relays and has pushbuttons for manual changes in relay states.

The example is based on a sliding door with microwave sensors that is supposed to open automatically during working hours on workdays, but only with ID badge reading at all other times.



Notes:

- The relay module's relays are used in the following way:
  - Relay1

    ON -from 00:00 to 23:59 when it's a non-workday (holiday e.g. Easter, Christmas, National Holidays. Sundays)

    OFF -all other cases i.e normal workdays
  - Relay2

ON – during office hours on workdays,

OFF – outside office hours

- Relay1 has two separate NC-C-NO outputs. One is used to signal to the SL-83 controller's Sensor or Egress input when the non-workdays are, in order to override the normal access control schedule. The other output is used to override Relay2, which signals to the sliding door controller when to open the door for anyone in the microwave sensor's path i.e. during office hours.
- The sliding door controller has a voltage-free input that, when shorted, will cause the door to open when someone is in the microwave sensor's field on either side of the door. If this contact is open, the door will only open from the outside when a badge is read and the SL-83 controller shorts a different contact for a short time.

Output patterns

The SL-62 uses 2 SPDT and one DPDT relay to connect a 12VDC voltage to pins 1 and 2 of the output screw terminal with two different polarities. Pin 3 is either shorted to pin 1 or pin 2, thereby generating 4 different combinations with a 12V supply each.

These patterns are shown in the following table:

	Output pin 1	Output pin 2	Output pin 3
Pattern 1	12V	0V	12V
Pattern 2	12V	0V	0V
Pattern 3	0V	12V	0V
Pattern 4	0V	12V	12V
Default/OFF	0V	0V	0V

Output pins 1 and 2 carry the supply voltage in all patterns, so one has to be 12V, the other 0V in all patterns.

Configuration/Time events

Up to 32 time events can be configured in the SL-62. When a Time Event occurs, one of the four output patterns is generated on the output pins (1,2,3) for a specified number of seconds (1 to 32).

Time events can be specified using the following criteria:

Year	00..99 or DON'T CARE
Month	1..12 or DONT'CARE
Day	1..31 or DON'T CARE
Day of Week	Each day in the week can be checked or not
	Check all days of week for DON'T CARE
Hour	00..23 or DON'T CARE
Minute	00..59 or DON'T CARE

Each time event can have the following set as outputs:

Output pattern	OFF, 1, 2, 3, 4
Output pattern duration (seconds)	1s to 32s

Configuration EEPROM/Memory map and format

The SL-62 time event configuration is stored in the internal EEPROM of the ATMega88 microcontroller. Commands for reading and writing into this EEPROM will be shown later.

Address	Name	Description
0	EA_RESET	Reset counter
2	EA_CNF	Configuration byte
3	EA_TO	Timeout
4	IDGR1_EEA	Function key 2 index (00..0A)
6	IDGR2_EEA	Function key 3 index (00..0A)
8	IN1LH_EEA	Function key 4 index (00..0A)
10	IN1HL_EEA	
12	IN2LH_EEA	
14	IN2HL_EEA	Controller ID (00.FF)
16	TE01_EEA	Time Event 1 Action Word (2 bytes)
18	TE02_EEA	Time Event 2 Action Word (2 bytes)
20	TE03_EEA	Time Event 3 Action Word (2 bytes)
22	TE04_EEA	Time Event 4 Action Word (2 bytes)
24	TE05_EEA	Time Event 5 Action Word (2 bytes)
26	TE06_EEA	Time Event 6 Action Word (2 bytes)
28	TE07_EEA	Time Event 7 Action Word (2 bytes)
30	TE08_EEA	Time Event 8 Action Word (2 bytes)
32	TE09_EEA	Time Event 9 Action Word (2 bytes)
34	TE10_EEA	Time Event 10 Action Word (2 bytes)
36	TE11_EEA	Time Event 11 Action Word (2 bytes)
38	TE12_EEA	Time Event 12 Action Word (2 bytes)
40	TE13_EEA	Time Event 13 Action Word (2 bytes)
42	TE14_EEA	Time Event 14 Action Word (2 bytes)
44	TE15_EEA	Time Event 15 Action Word (2 bytes)
46	TE16_EEA	Time Event 16 Action Word (2 bytes)
48	TE17_EEA	Time Event 17 Action Word (2 bytes)
50	TE18_EEA	Time Event 18 Action Word (2 bytes)
52	TE19_EEA	Time Event 19 Action Word (2 bytes)

54	TE20_EEA	Time Event 20 Action Word (2 bytes)

Address	Name	Description
56	TE21_EEA	Time Event 21 Action Word (2 bytes)
58	TE22_EEA	Time Event 22 Action Word (2 bytes)
60	TE23_EEA	Time Event 23 Action Word (2 bytes)
62	TE24_EEA	Time Event 24 Action Word (2 bytes)
64	TE25_EEA	Time Event 25 Action Word (2 bytes)
66	TE26_EEA	Time Event 26 Action Word (2 bytes)
68	TE27_EEA	Time Event 27 Action Word (2 bytes)
70	TE28_EEA	Time Event 28 Action Word (2 bytes)
72	TE29_EEA	Time Event 29 Action Word (2 bytes)
74	TE30_EEA	Time Event 30 Action Word (2 bytes)
76	TE31_EEA	Time Event 31 Action Word (2 bytes)
78	TE32_EEA	Time Event 32 Action Word (2 bytes)
80	IDTAB11	ID table 1 entry 1 (Not Used)
88	IDTAB12	ID table 1 entry 2 (Not Used)
96	IDTAB21	ID table 2 entry 1 (Not Used)
104	IDTAB22	ID table 2 entry 2 (Not Used)
112	CID_EEA	Controller ID (8 chars)
120	DCOM1	(Not Used)
122	DCOM2	(Not Used)
124	DCOM3	(Not Used)
126	DCOM4	(Not Used)
128=0x80	TSETUP01	Setup data for Time Event 1
0x88	TSETUP02	Setup data for Time Event 2
0x90	TSETUP03	Setup data for Time Event 3
0x98	TSETUP04	Setup data for Time Event 4
0xA0	TSETUP05	Setup data for Time Event 5
0xA8	TSETUP06	Setup data for Time Event 6
0xB0	TSETUP07	Setup data for Time Event 7
0xB8	TSETUP08	Setup data for Time Event 8

0xC0	TSETUP09	Setup data for Time Event 9
0xC8	TSETUP10	Setup data for Time Event 10

0xD0	TSETUP11	Setup data for Time Event 11
0xD8	TSETUP12	Setup data for Time Event 12
0xE0	TSETUP13	Setup data for Time Event 13
0xE8	TSETUP14	Setup data for Time Event 14
0xF0	TSETUP15	Setup data for Time Event 15
0xF8	TSETUP16	Setup data for Time Event 16
0x100	TSETUP17	Setup data for Time Event 17
0x108	TSETUP18	Setup data for Time Event 18
0x110	TSETUP19	Setup data for Time Event 19
0x118	TSETUP20	Setup data for Time Event 20
0x120	TSETUP21	Setup data for Time Event 21
0x128	TSETUP22	Setup data for Time Event 22
0x130	TSETUP23	Setup data for Time Event 23
0x138	TSETUP24	Setup data for Time Event 24
0x140	TSETUP25	Setup data for Time Event 25
0x148	TSETUP26	Setup data for Time Event 26
0x150	TSETUP27	Setup data for Time Event 27
0x158	TSETUP28	Setup data for Time Event 28
0x160	TSETUP29	Setup data for Time Event 29
0x168	TSETUP30	Setup data for Time Event 30
0x170	TSETUP31	Setup data for Time Event 31
0x178	TSETUP32	Setup data for Time Event 32

Configuration data formats

Time Event Action Words

The 16-bit Action Words stored in EEPROM define what happens when a specific Time Event happens. Some features are not implemented currently.

H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
			S4	S3	S2	S1	S0	IN21	IN20	IN11	IN10	O2	O1	O0	R

- S4..S0 duration of output pattern in seconds (binary value +1) e.g. 00000 = 1s
- IN21..20 00 Always do Time Event

01 Do Time Event if IN1=H (input open)

10 Do Time Event if IN=L (input shorted)

11 Always do Time Event

- IN11.10 00 Always do Time Event

01 Do Time Event if IN1=H (input open)

10 Do Time Event if IN=L (input shorted)

11 Always do Time Event

- O2..0

O210	Pattern name	Relay A (PWR)	Relay B (POL)	Relay C (13 or 23)
0 0 0	OFF	OFF	OFF	OFF
0 0 1	1	ON	OFF	OFF
0 1 0	2	ON	OFF	ON
0 1 1	3	ON	ON	OFF
1 0 0	4	ON	ON	ON
1 0 1	Not Used	OFF	OFF	OFF
1 1 0	Not Used	OFF	OFF	OFF
1 1 1	Not Used	OFF	OFF	OFF

  -

- R make record of event (Not Used)

Note: the H byte (H7..H0) is at the lower address and the L byte is at the higher address.

Time Event Setup

Each Time Event has 8 bytes which define when the time event will be activated:

Address offset	Contents	Description
Base+0	Year	BCD 10 and 1 digit of Year, 0xA5 for Don't Care
Base+1	Month	BCD Month, 0xA5 for Don't Care
Base+2	Day	BCD Day, 0xA5 for Don't Care
Base+3	Hour	BCD Hour, 0xA5 for Don't Care
Base+4	Minute	BCD Minutes, 0xA5 for Don't Care
Base+5	Day of week	Bitmap: b7:0. b6=Mon, .. b0=Sun, 0-No, 1=Yes
Base+6	CSUM	Checksum of bytes 0 to 5
Base+7	NCSUM	Inverted checksum of bytes 0 to 5

EA_CNF

This is a general configuration byte. Currently, only the LCD language selection is stored here.

7	6	5	4	3	2	1	0
						L1	L0

- L1..0 LCD language:
  - 00 Serbian
  - 01 English
  - 10 Hungarian
  - 11 Greek

EA_TO

This configuration byte sets the timeout for all communication with CommService or any other future configuration program.

7	6	5	4	3	2	1	0
						T1	T0

- T1..0 Communication timeout
  - 00 1s
  - 01 2s
  - 10 4s
  - 11 8s

Communication protocol

The SL-62 has a 10MB/s Ethernet module and communicates with the CommService program via a regular LAN network, either locally or through a router.

The following list shows the commands for reading the status of the SL-62, setting the time&date and reading/writing to the EEPROM.

Status command

This command is used to get basic information from the SL-62 such as current time&date according to the SL-62's RTC etc.

PC→ SL-62

<SOH>

SL-62 → PC

<ACK>

PC→ SL-62

“SS”

SL-62 → PC

<CR>, “V “,VERN1,VERN2,VERL,

<CR>,”T “,TIMESTRING,

<CR>.”S 0000”,

<CR>,”R “,RESETNUM,

<CR>,”F ”,TENUM,

<CR>,”I “,CID,

<CR>,”RP 4567”,

<CR>,”WP 5678”.

<CR>.”TO 6789”,<CR>

Notes:

- <SOH> = 0x01
- <ACK> = 0x06
- VERN1, VERN2, VERL are ASCII characters denoting version numbers 1,2 and version

letter respectively

- TIMESTRING is an ASCII string containing the current time and date plus weekday:
  - “DD.MM.YYWhh:mm:ss\0”
  - DD are days
  - MM are months
  - YY are tens and ones digits of the year
  - W is day of week: '0' Sunday, '1' Monday. …. , '6' Saturday
  - hh are hours
  - mm are minutes
  - ss are seconds
- RESETNUM is a 4 character ASCII number in hex, denoting the number of times the SL-62 has been reset. In case this number keeps increasing, there may be EMI problems which need to be addressed.
- TENUM is a 4 character ASCII number in HEX, denoting the number of currently configured Time Events (00..32)
- CID is a 2 character ASCII number ib HEX, denoting the Controller ID (this information is only relevant if there are several SL-62 units in a system and they have different configurations).
- All the rest of the data are fixed numeric values and are there for compatibility and serve no purpose in the case of SL-62.

Set Time and Date command

This command is used to set the current time and date in the Real Time Clock chip of the SL-62.

PC→ SL-62

<SOH>

SL-62 → PC

<ACK>

PC→ SL-62

“DD”, TIMESTRING

SL-62 → PC

- <ACK> received OK
- <NAK> <'1'> timeout, less characters than expected

- <NAK><'2'> LRC error

Notes:

TIMESTRING = D10,D1,s10,M10,M1,s1,Y10,Y1,dow,h10,h1,':',m10,m1,LRC

- All characters BCD ASCII i.e. '0'..'9'
- D10, D1 – 10s and 1s digits of day
- M10, M1 – 10s and 1s digits of month
- Y10, Y1 – 10s and 1s digits of year
- h10, 10 – 10s and 1s digit of hours
- m10, m1 – 10s and 1s digit of minutes
- s10, s1 – 10s and 1s digits of seconds
- dow – day of week. '0' - sunday .. '6' saturday
- LRC – XOR of all data bytes from D10 to m1 and result OR-ed with 0x20

Read EEPROM Command

This command is used to read a byte from a single location in the EEPROM

PC→ SL-62

<SOH>

SL-62 → PC

<ACK>

PC→ SL-62

“aa”, ADDRSTR

SL-62 → PC

- EEPROMData
- <NAK> <'1'> timeout, less characters than expected
- <NAK><'2'> LRC error

Notes:

- EEPROMData DH, DL, LRC
  - DH is an ASCII HEX number showing the high nibble of the data at the given address
  - DL is an ASCII HEX number showing the low nibble of the data at the given address
  - LRC is the XOR of DH and DL and the resulting byte OR-ed with 0x20
- ADDRSTR AHH, AHL, ALH, ALL,LRC
  - AHH, ALH ASCII hex characters denoting the high and low nibble of the high byte of the EEPROM address to read
  - ALH, ALL ASCII hex characters denoting the high and low nibble of the low byte of the EEPROM address to read
  - LRC is the XOR of AHH,AHL,ALH, ALL and the result OR-ed with 0x20

Write EEPROM Command

PC→ SL-62

<SOH>

SL-62 → PC

<ACK>

PC→ SL-62

“bb”, ADDRDATASTR

SL-62 → PC

- <ACK> data written
- <NAK> <'1'> timeout, less characters than expected
- <NAK><'2'> LRC error

Notes:

- ADDRDATASTR = ADHH, ADHL,ADLH, ADLL,DATH, DATL, LRC
  - ADHH, ADHL - ASCII hex characters denoting high and low nibble of the high byte of the EEPROM address to write to
  - ADLH, ADLL -ASCII hex characters denoting high and low nibble of the low byte of the EEPROM address to write to
  - DATH, DATL -ASCII hex characters denoting high and low nibble of data to

be written

Soft Reset Command

This command causes the SL-62 to reset itself. This may come in usedful in case of irregular behaviour.

PC→ SL-62

<SOH>

SL-62 → PC

<ACK>

PC→ SL-62

“YY”

SL-62 → PC

- <ACK> reset command carried out
- <NAK> <'1'> timeout, less characters than expected
- <NAK><'2'> LRC error