Littfinski **D**aten**T**echnik (**LDT**)

Assembly Instruction

Light-Signal Decoder

for light-signals with LED

from the *Digital-Professional-Series* !

LS-DEC-FS-B Part-No.: 510211

>> kit <<

Suitable for the digital systems: Märklin-Motorola and **DCC**

For direct digital control of:

⇒ up to four 3- and 4- aspect Light Signals of the Governmental Railway Corporation of Italy - Ferrovie dello Stato (FS)

⇒ up to two 11- aspect FS-Signals

With implemented **dimming function** and short **dark phase** between signal aspects.

Suitable for light signals of the company **Essemme S.r.l., Milano (Italy)**.

This product is not a toy! Not suitable for children under 14 years of age!
The kit contains small parts, which should be kept away from children under 3! Improper use will imply danger of injuring due to sharp edges and tips! Please store this instruction carefully.

Label:
FS

4 038264 024346

Introduction:

You have purchased the Light-Signal Decoder kit **LS-DEC** for your model railway supplied within the assortment of **L**ittfinski **D**aten**T**echnik (**LDT**).

- These kits are of high quality and easy to assemble.

We are wishing you having a good time for assembling and application of this product.

General:

Tools required for the assembly

Please assure that the following tools are available:

- a small side cutter
- a mini soldering iron with a small tip
- solder tin (if possible 0.5mm diameter)

Safety Instructions

- We designed our devices for indoor use only.
- All electrical and electronic components included in this kit shall be used on low voltage only by using a tested and approved voltage transducer (transformer). All components are sensitive to heat. During soldering the heat shall be applied for a very short period only.
- The soldering iron develops a heat up to 400°C. Please keep continual attention to this tool. Keep sufficient distance to combustible material. Use a heat resistant pad for this work.
- This kit consist of small parts which can possibly be swallowed by children. Children (especially under 3 years) shall not participate on the assembly without supervision.

Set-Up:

For the board assembly please follow exact the sequence of the below **assembly list**. Cross each line off as **done** after completing the insertion and the soldering of the respective part.

For the **diodes** please keep special attention to the correct polarity (marked line for the cathode).

With reason to different makes of **electrolytic capacitors** you will find different markings of the polarity. Some are marked with "+" and some are marked with "-". Each capacitor has to be assembled to the board that the marking on the capacitor is in correspondence with the marking on the pc-board.

Resistor networks are marked for assembly with a printed circle or a square at one end. Insert this component that way that the marking corresponds with the marking between the first and second bore on the pc board. Additionally has been the first bore marked at the pc-board with a “1”.

**Integrated circuits (IC`s)** are either marked with a half round notch on one end or a printed point for the correct mounting position. Push the IC`s into the correct socket assuring that the notch or the printed point is corresponding to the half-rounded marking on the pc-board.
Please attend to the sensitivity of the **IC`s** to **electrostatic discharge** which will cause immediate damage of the IC. Before touching those components please discharge yourself by contacting an earthed metal (for example an earthed radiator) or work with an electrostatic safety pad.

Three 3-pole clamps and one 2-pole clamp each have to be connected to 2 clamp-blocks of 11 poles each before assembly.

Assembly list:

Pos.	Qty.	Component	Remarks	Ref.	Done
1	1	Pc-board			
2	2	Diode 1N4003	attend to the polarity!	D1, D2	
3	1	Diode 1N5819	attend to the polarity!	D3	
4	5	Networks 4*330Ohm	attend to the polarity!	R8..R12	
5	2	Resistors 1,5kOhm	brown-green-black-brown	R1, R2	
6	3	Resistors 18kOhm	brown-gray-black-red	R3, R4, R5	
7	1	Resistor 220kOhm	red-red-black-orange	R6	
8	1	Resistor 1MOhm	brown-black-black-yellow	R7	
9	3	Capacitors 100nF	100nF = 104	C3, C4,C5	
10	1	Pin plug bar		J1, J2,J3	
11	1	IC-socket 28poles		IC1	
12	2	IC-sockets 8poles		IC2, IC4	
13	1	IC-socket 6poles		IC3	
14	1	Resonator 16MHz		CR1	
15	2	Electrolytic cap. 220µF/35V	attend to the polarity!	C6, C7	
16	1	Coil 330uH	gold-brown-red-red	L1	
17	1	Push button		S1	
18	4	Clamps 2-poles		KL1..KL4	
19	6	Clamps 3-poles	build blocks before assy´!	KL5..KL10	
20	1	IC: Z86E3016	attend to the polarity!	IC1	
21	1	IC: 24C01	attend to the polarity!	IC2	
22	1	IC: 4N25 or CNY17	attend to the polarity!	IC3	
23	1	IC: LM2574	attend to the polarity!	IC4	
24			final control		

Made in Europe by
Littfinski **D**aten**T**echnik (**LDT**)
Bühler electronic GmbH
Ulmenstraße 43
15370 Fredersdorf / Germany
Phone: +49 (0) 33439 / 867-0
Internet: www.**ldt-infocenter**.com

Subject to technical changes and errors. © 09/2022 by LDT
Märklin and Motorola are registered trademarks

Soldering instruction

Provided you have no special experience in soldering electronic components please read first this soldering instruction before starting the job. Soldering has to be trained!

1. Never use additional fluxes for soldering electronic circuits which contain acids (e.g. zinc chloride or ammonium chloride). Those can destroy components and printed circuits when not washed off completely.
2. As soldering material only lead free soldering tin with a rosin core for fluxing should be used.
3. Use a small soldering iron with max 30 Watt heating power. The solder tip shall be free from scale to assure an excellent heat transfer to the area to be soldered.
4. The soldering shall be performed on a speedy way because a long heat transfer can destroy the components. Too much or too long heating can take off the copper pads and copper tracks from the board.
5. For a good soldering a well tinned solder-tip has to be brought in contact to the copper-pad and the component wire at the same time. Simultaneous a little solder-tin shall be applied for heating up. As soon as the solder-tin starts melting the tin wire has to be taken away. Just wait until the tin has well wetted the pad and the wire and take the soldering iron away from the soldering area.
6. Make sure not to move the just soldered component for about 5 seconds after removing the soldering iron. This should create a silver shining faultless soldering joint.
7. For a faultless soldering joint and well done soldering is a clean non-oxidized soldering-tip absolutely required. It is not possible to perform a sufficient soldering joint with a dirty soldering tip. Therefore please clean the soldering tip from excessive solder-tin and dirt by using a wet sponge or a silicone cleaning pad after each soldering process.
8. After completion of the soldering all connection wires have to be cutted off directly above the soldering joint by using a side cutter.
9. By soldering semiconductors (transistors, diodes), LED`s and IC`s is it very important never to exceed the soldering time of 5 seconds to prevent the destruction of the component. It is absolutely required to attend to the correct polarity of the component before starting the soldering process.
10. After the board assembly carefully control the pc-board about correct insertion of the components and the correct polarity. Please check if no connections or copper tracks are accidentally short circuited by soldering tin. This can not only result to malfunction of the module but also result to a destruction of expensive components.
11. Please take into account that improper soldering joints, wrong connections, faulty operation or wrong board assembly is not a matter within our sphere of influence.

General installation information

The contact-wires of resistors and diodes to be assembled in a lying position shall be bended in accordance to the raster distance into a right angular position and assembled into the specified bores (in accordance to the board assembly plan or the assembly markings). To prevent that the components will not fall out by turn-over the pc-board please bend the connection wires about 45° apart and solder them carefully to the copper pads on the rear side of the board. Finally the excessive wires shall be cutted off with a small side cutter.

The resistors in the supplied kits are metal-foil resistors. Those have a tolerance of 1% and are marked with a brown “tolerance-ring”. The tolerance ring can be identified by the larger margin distance respectively the larger distance to the other four marking rings. Normally there are five color rings on the metal-foil resistors. To read the color code you have to locate the resistor that way that the brown tolerance ring will be on the right side. The color rings will be red now from left to right!

Please take care to assemble diodes with the correct polarity (position of the cathode marking). Take care about a very short soldering time! The same will apply to the transistors and the integrated circuits (IC`s). The flat side of the transistors has to correspond with the marking on the pc-board.

The transistor legs should never be assembled in a crossed position. Further those components should have a distance of about 5mm to the board. Attend to the short soldering time to prevent the damage of the component by excessive heat.

Capacitors shall be assembled into the respective marked bores, the wires to be bent a little apart and careful soldered to the copper pad. By the assembly of electrolytic capacitors (electrolytic cap) it has to be attended to the correct polarity (+,-)! **Wrong-way soldered electrolytic capacitors can explode during the application!** Therefore is it very important to check the correct polarity two- or even better three-times. In addition it has to be attended to the correct capacitor values, e.g. n10 = 100pF (not 10nF!).

A careful and clean assembly will drastically reduce the possibility that anything will not be in correct function. Check every step and every soldering joint two times before carrying on! Attend closely to the assembly list! Perform the described step not different and do not skip any step! Mark each step as done at the foreseen column after assembly and careful check.

Take your time. Private work is no piece-work because the time for careful assembly work is much less than an extensive fault diagnosis.

Final assembly

Sockets and integrated circuits (IC´s) of the kits will be supplied on a piece of foam to assure safe transport.
This foam shall never be used below or between components as this foam is electrical conductive.

In case the kit will be taken into operation the conductive foam can produce a short circuitry and destroy the complete kit. Anyhow the function of the module will not be as expected.

Warranty

As we have no influence to the proper and correct assembly we have to limit our warranty to the complete supply and the faultless quality of the components.

We guarantee the function of the components in accordance to the identified values within a non-assembled condition of the parts and the compliance of the technical data of the circuit by attending to the respective soldering instruction and the specified start of operation of the module including connection and operation.

Further demands are not accepted.

We are not taking over any warranty nor any liability for any harm or sequential damage connected to this product.

We reserve our right for a repair, rework, supply of replacement or refund of the purchase price.

The following criteria will result to a non-repair respectively to a lost of right to claim under guarantee:

- if acid-containing soldering tin or fluxes with corrosive content and others have been used
- if the kit has been improper soldered or assembled
- by alterations or repair-trials on the device
- by own circuit amendments
- by construction of non-intended improper displacement of components, free wiring of components etc.
- application of other non-original kit-components
- by damaging of copper tracks or soldering copper pads on the board
- by wrong assembly and the sub sequential damages
- overloading the module
- by damages caused by intervention of foreign persons
- by damages caused by disregarding the operation manual respectively the connection plan
- by connecting a wrong voltage respectively a wrong current
- by wrong polarity connection of the module
- by wrong operation or damages caused by negligent usage or abuse
- by defects caused by bridged or wrong fuses.

All such cases will result to a return of the kit to your expenses.

Subject to technical changes and errors. © 05/2013 by LDT