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

Assembly Instruction

16-fold feedback module

from the *Digital-Professional-Series* !

RS-16-O-B Part-No.: 310201

>> kit <<

As **LR101** but with 16 inputs and additional optocoupling for potential separation and for high interference safety.

Suitable for the RS-feedback bus

⇒ **controls up to 16 feedback contacts**
(safe galvanic separation by opto coupler).

⇒ **separated by opto coupler**
(contacts can be separated from layout ground connection).

⇒ **compatible to RS-feedback bus**
(can be operated together with RS-8, LR101, LS100 etc.).

⇒ **suitable for Lenz Digital plus System.**

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.

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Introduction:

You have purchased the 16 fold feedback module **RS-16-O** with galvanic separation by opto coupler for your model railway. The **RS-16-O** is a high quality product that is supplied within the ***Digital-Professional-Series*** of **L**ittfinski **D**aten**T**echnik (**LDT**).

We wish you having a good time using this product.

The feedback module **RS-16-O** can be easily operated on the RS-feedback bus of your digital model rail way.

The **RS-16-O** is compatible to all digital model railways with RS-feedback bus (e.g. **Digital Plus** from Lenz).

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 from 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.

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 or directly into the pc-board (IC11**) 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 ICs to **electrostatic discharge,** which will cause immediate damage of the IC. Before touching those components please discharge yourself by contacting an earthed metal (e.g. earthed radiator) or work with an electrostatic safety pad.

Attend to the flat side of the **transistors**.

Resistor networks are marked at the one side with a printed circle or a square for Pin 1.

Before assembling the unit clip the **clamps** together to a block with the required **connections**.

The **light emitting diodes** have to be assembled with the longer leg to be connected to "+" on the pc-board. Before soldering the diodes push the **distance spacer tubes** on to the legs.

Assembly list

Pos.	Qty.	Component	Remarks	Ref.	Done
1	1	Pc-board			
2	2	Resistors 1,5KOhm	brown-green-black-brown	R1, R2	
3	1	Resistor 220KOhm	red-red-black-orange	R3	
4	2	Resistors 2,2KOhm	red-red-black-brown	R4, R9	
5	1	Resistor 220Ohm	red-red-black-black	R5	
6	1	Resistor 120Ohm	brown-red-black-black	R6	
7	1	Resistor 33Ohm	orange-orange-black-gold	R7	
8	2	Resistors 22KOhm	red-red-black-red	R8, R10	
9	1	Resistor 3,3KOhm	orange-orange-black-brown	R11	
10	1	Resistor 1MOhm	brown-black-black-yellow	R12	
11	4	Networks 4*10kOhm	attend to the polarity!	RN1 ... 4	
12	2	Networks 8*10kOhm	attend to the polarity!	RN5 ... 6	
13	2	Diodes 1N4148	attend to the polarity!	D1, D5	
14	1	Diode 1N4003	attend to the polarity!	D2	
15	2	Diodes BZX83 5V6	attend to the polarity!	D3, D4	
16	4	Capacitors 100nF	100nF = 104	C19...22	
17	1	IC: LTV817	attend to the polarity!	IC11	
18	1	IC-socket 18poles		IC1	
19	2	IC-sockets 16poles		IC2, IC3	
20	4	IC-sockets 16poles		IC5 ... 8	
21	1	IC-socket 8poles		IC4	
22	2	IC-sockets 6poles		IC9, 10	
23	1	Resonator 8MHz		CR1	
24	1	Electrolytic capacitor 100uF/25V	attend to the polarity!	C18	
25	1	Electrolytic capacitor 220uF/35V	attend to the polarity!	C17	
26	1	Push button		S1	
27	4	Transistors BC 547	attend to the polarity!	T1 ... T4	
28	1	LED plus spacers	attend to the polarity!	LED1	
29	4	Clamps 2poles	build blocks before assembly		
30	5	Clamps 3poles	build blocks before assembly		
31	1	IC: Z86E0812PSC	attend to the polarity!	IC1	
32	2	IC: 4014	attend to the polarity!	IC2, 3	
33	1	IC: 93C46	attend to the polarity!	IC4	
34	4	IC:LTV844	attend to the polarity!	IC5 ... 8	
35	2	IC:CNY17III	attend to the polarity!	IC9, 10	
36			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
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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. To much or to 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.

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