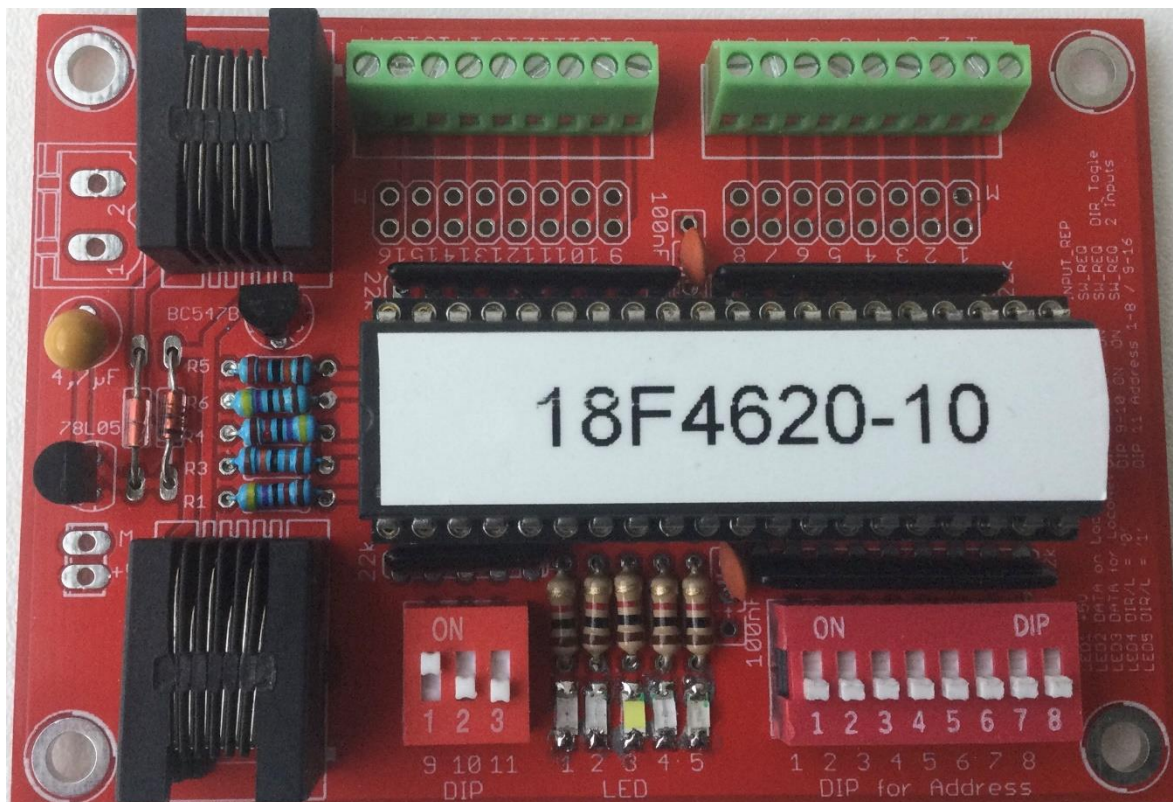


DIY LocoNet 16 input ports:

This device can send LocoNet messages. The circuit has 16 inputs that all have the same function. It was decided to perform the function and address settings with DIP switches. No programming with a computer or central station is required. The function can be selected via DIP9 and DIP10. The address of input 1 is set via DIP ADDRESS1-8 (and optionally DIP11) in steps of 16 addresses per circuit. The following 15 inputs have an ascending address with respect to input 1. The circuit offers various connection options.

More information about the LocoNet opcodes can be found in "Personal Use Edition 1.0 SPECIFICATION" on the Digitrax website.

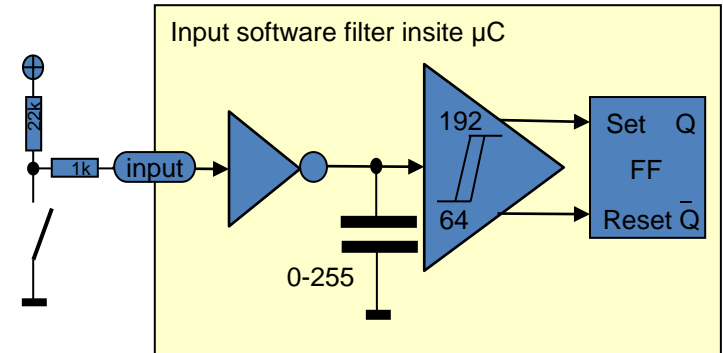


PCB LocoNet input device Version 1. There will be an update later for the PCB (version 2) where there are extra options for connections.

Specific features of this circuit:

The circuit consumes very little power. The possibility is provided to take 5V via a voltage stabilizer 78L05 from pin 5 and 6 LocoNet cable. There is also a possibility to connect an external 5V with a connector. Then the 78L05 may not be present on the PCB!

The software filters out any interference signal from every input.
A decision whether an input is high or low is made after 256 samples.



The capacitor is an up-down counter that counts one step up or down each software cycle depending on the logic state input. When the counter reaches 192 it Sets the Flip-Flop, when the counter reaches 64 it Resets the Flip-Flop

Indication LEDs on device:

LED1: 5V present. If 5V for device comes from LocoNet (via 78L05 voltage stabilizer) and the LED does not light up, there is a problem with the network.

LED2: Lights up (0.1s) when a message is read from LocoNet. All messages are read, including those coming from this device. Failure to illuminate this LED may indicate a problem with the network.

LED3: Lights up when this device has LocoNet commands in send buffer and goes out when all commands have been sent successfully. If this LED stays on, it may indicate that there is a problem with the network.

LED4: Lights up (0.2s) when a LocoNet command is placed in the sent buffer where DIR = '1'. This LED is useful to check whether the connected switches or detection are properly read, if not this may indicate a problem.

LED5: Lights up (0.2s) when a LocoNet command is placed in the sent buffer where DIR = '0'. This LED is useful to check whether the connected switches or detection are properly read, if not this may indicate a problem.

Cost Price Parts: **Cost price ano February 2021 purchased with several units!**

PCB Version 1: 1,524€ (10 pcs = 15,24€)

40 pin IC socket: 0.272€

2x Condensator 100nF: 0,0155 = 0,0310€

Elco 4,7µF 25V: 0,071€

10x Resistor 1/4W: 0.0148 = 0,148€ (5x1k; 2x47k; 220k; 180k; 4,7k)

78L05: 0,04€

2x Diode 1N4148: 0,02 = 0.04€

SIL Resistor network 5x22k: 0.0526€

3x SIL Resistor network 9x22k: 0,091 = 0,273€

Dip 3xSwitch: 0,081€

Dip 8xSwitch: 0,095€

2x RJ11 female: 0,0852 = 0,174€

µC 18F4620: 2,78€

Transistor BC547: 0,0442€

5x SMD LED 1206: 0,007 = 0,035€

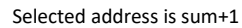
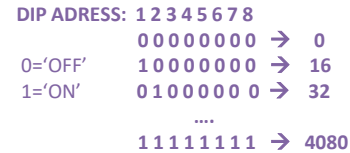
total 5,8€

2x Screw connector 2,54mm 9pin 0,356 = 0,712€

total 6,5€

A resistor network of 5x22k is used on the PCB, this may not be replaced by a resistor network of a different value!

Device give LocoNet command OPC_INPUT_REP with selected address. Sensor is high L='1' as switch is closed, and sensor is low L='0' where switch is opened.



OPC_INPUT_REP & DIP ADDRESS

+0 → INPUT 1
+1 → INPUT 2
.....
+16 → INPUT 16

& Sensor Level

↓ ↓ ↓ ↓

OPCODE= 0xB2 A3,A4,A5,A6
 A7,A8,A9,A10

I,A0,A1,A2

L= '0' or '1'

For example, sensor can be mass-sensing or current-sensing when track is occupied

DIP ADDRESS: 1 2 3 4 5 6 7 8

	0 0 0 0 0 0 0 0	→	0
0='OFF'	1 0 0 0 0 0 0 0	→	16
1='ON'	0 1 0 0 0 0 0 0	→	32
		
	1 1 1 1 1 1 1 1	→	4080

the circuit is only used for occupancy feedback then it is not necessary to use DIP switches 9 10 11 on the PCB.

DIP 9 = 'ON'
DIP10 = 'OFF'
DIP11 = 'XXX'

Device give LocoNet command OPC_SW_REQ with selected address, and DIR = '1' as switch is closed, and DIR = '0' where switch is opened.

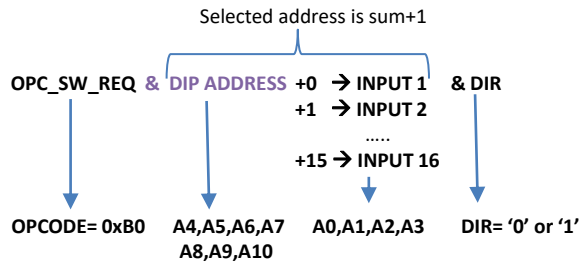
↗ = Switch is closed
 ↖ = Switch is opened



DIP ADDRESS:	1	2	3	4	5	6	7
	0	0	0	0	0	0	0
0='OFF'	1	0	0	0	0	0	0
1='ON'	0	1	0	0	0	0	0
						
	1	1	1	1	1	1	1

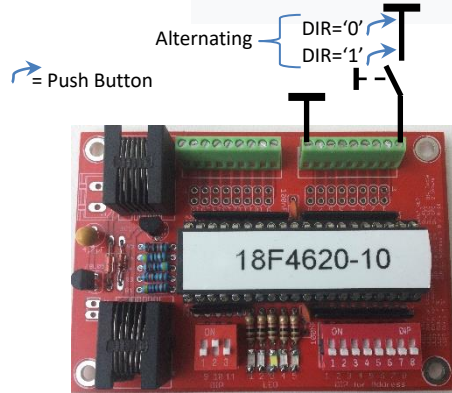
0000000 → 0
 1000000 → 16
 0100000 → 32

 1111111 → 2032



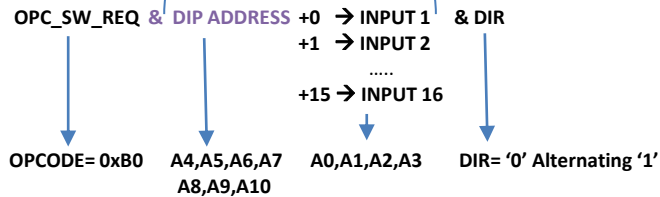
DIP 9 = 'OFF'
DIP10 = 'ON'
DIP11 = 'XXX'

Device give LocoNet command OPC_SW_REQ with selected address, and DIR is alternating between '0' and '1' every time the button is pressed.
The current DIR state is stored in EEPROM, so that it can be taken over after power-on.



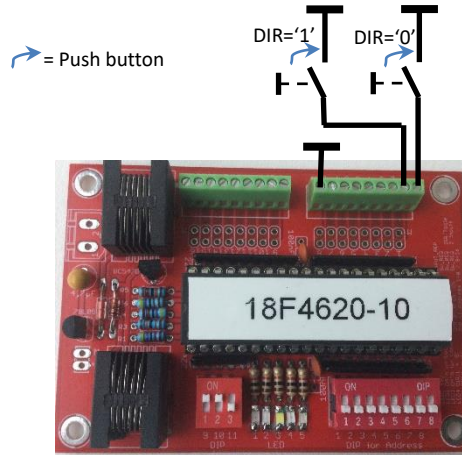
DIP ADRESS: 1 2 3 4 5 6 7
0000000 → 0
0='OFF' 1000000 → 16
1='ON' 0100000 → 32
....
1111111 → 2032

Selected address is sum+1



DIP 9 = 'ON'
DIP10 = 'ON'
DIP11 = 'OFF' or 'ON'

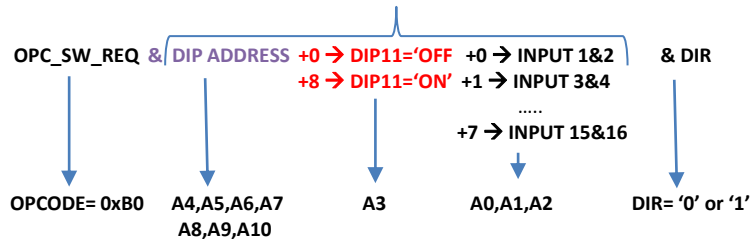
Device give Loconet command OPC_SW_REQ and two consecutive inputs with the same selected address. First input gives DIR='0' when button closed. Second input gives DIR='1' when button closed.



DIP ADDRESS: 1 2 3 4 5 6 7

0000000	→ 0
1000000	→ 16
0100000	→ 32
....	
1111111	→ 2032

Selected address is sum+1



The latest update can also read **2 times 8 keys**. Each key has the ability to light up LEDs. The PCB and the software have been adapted for this. This update is now being tested.

A PCB still needs to be developed for the keys and the LEDs.

