

**ESU**

# LOKPILOT Micro

- ✓ For N scale locomotives. Easy Drop in Design!
- ✓ Uses 4, 8 or 16 Ohm speakers
- ✓ Six output functions, 50mA each. Two outputs hardwired to SMT - mount LEDs
- ✓ LED for Headlight and Rearlight can be length-adjusted. Two free outputs.
- ✓ Suitable for use with any DCC system or DC
- ✓ Decoder with BEMF (aka Load compensation)
- ✓ Fully reprogrammable Decoder using ESU LokProgrammer

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**54650**  
LokPilot V4.0 Direct Micro  
Ready for Programming  
Suitable for many N scale engines 4, 1044645 | 546505 |

| Operational modes  | Power  | Sound  | Programming   | Function outputs   | dimensions in mm   | Item-Number   |
|--|--|--|---|--------------------|--|---|
| NMRADCC with 14, 28, 128 speed steps.<br>2-digit (short) and 4-digit (long) addresses.<br>Analog DC operation (de-selectable).<br>Automatic recognition of operational mode and DCC speed step selection.<br>Supports LenZ® IG 100 braking sections, ABC brake sections and «Brake on DC».<br>Runs DC and coales motors.<br>0.75 A continuous load / 1.00A peak load. Silent, safe, 40,000 kHz pulse width frequency motor BEMF<br>Shunting speed and momentum key selectable<br>Motor output overload protected | 0.75 A continuous load / 1.00A peak load. Silent, safe, 40,000 kHz pulse width frequency motor BEMF<br>Shunting speed and momentum key selectable<br>Motor output overload protected | Audio amplifier: 1.5W @ 4 Ohms load<br>Speaker impedance between 4 Ohms and 16 Ohms<br>Memory Capacity 32 MBIT. 8 Sound channels, all playable at once!<br>Library of over 100 sounds: available for download. | DCC Servicemode & DCC POM (Programming on Main)<br>RailCom® Feedback system. RailComPlus® automatic Registration.<br>6 powered outputs. | 6 powered outputs. | 66,0 x 8,2 x 4,5<br>66,0 x 8,2 x 4,5<br>2,60 x 0,32 x 0,18 | <b>54650</b><br><b>73100</b><br><b>73199</b>  |
|  |  |  |   |                    |  | <b>NON-SOUND VERSION</b>  |
|  |  |  |   |                    |  | Headlight and Rearlight outputs are already connected to SMT LEDs on the board.<br>66,0 x 8,2 x 4,5<br>2,60 x 0,32 x 0,18 |



This product is not a toy. Not recommended for children under 14 years of age.  
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

ESU P/N 03817-19437 [www.esu.eu](http://www.esu.eu) MADE IN CHINA

| Loco address                         | Short (2 digit) address of locomotive  | 1 - 127      | 3   |
|--------------------------------------|--|--------------|-----|
| 1 Loco address                       | Minimum speed of the locomotive  | 1 - 255      | 3   |
| 2 Start voltage                      | This value multiplied by 0.25 is the time from stop to maximum speed   | 0 - 255      | 80  |
| 3 Acceleration                       | This value multiplied by 0.25 is the time from maximum speed to stop   | 0 - 255      | 80  |
| 4 Deceleration                       | Maximum speed of the locomotive  | 0 - 255      | 255 |
| 5 Maximum speed                      | Medium speed of locomotive   | 0 - 255      | 88  |
| 6 Medium speed                       | Manufacturer's ID ESU - Writing value 8 in this CV triggers a reset  | 151          | -   |
| 8 Manufacturer's ID                  | Long address of engine (see full manual online at <a href="http://www.loksound.com">www.loksound.com</a> )   | 0-255        | 0   |
| 17/18 Long address of the loco       | Additional address for consist operation. Value 0 or 128 means: consist address is disabled. 1 - 127 consist address active, normal direction  |              |     |
| 19 Consist Address                   | 129 - 255 consist address: active reverse direction  |              |     |
| 27 Brake mode                        | Allowed brake modes:   |              | 28  |
|                                      | Bit Function Value   |              |     |
|                                      | 0 ABC braking, voltage higher on the right hand side   | 1            |     |
|                                      | 1 ABC braking, voltage higher on the left hand side  | 2            |     |
|                                      | 2 ZIMO® HLU brakes active  | 4            |     |
|                                      | 3 Brake on DC, if polarity against driving direction   | 8            |     |
|                                      | 4 Brake on DC, if polarity like driving direction  | 16           |     |
|                                      | 7 Loco brakes with constant brake distance, if FS=0  | 128          |     |
| 28 RailCom® Configuration            | Settings for RailCom®  |              | 131 |
|                                      | Bit Function Value   |              |     |
|                                      | 0 Channel 1 Address broadcast enabled  | 1            |     |
|                                      | 1 Data transmission allowed on Channel   | 2            |     |
|                                      | 7 RailCom® Plus automatic loco recognition active  | 128          |     |
| 29 Configuration register            | This CV contains important information to setup your decoder   |              | 12  |
|                                      | Bit Function Value   |              |     |
|                                      | 0 Reversed direction of travel   | 1            |     |
|                                      | 1 28 or 128 speed steps DCC  | 2            |     |
|                                      | 2 Enable analog operation  | 4            |     |
|                                      | 3 Enable RailCom®  | 8            |     |
|                                      | 4 Speed curve through CV 67 - 94 (instead of CV 2,5,6)   | 16           |     |
|                                      | 5 Long addresses (CV 17 + 18) in DCC mode  | 32           |     |
| 31 Index register H                  | Should be either "0" or "16" for Loksound Decoders   | 16           | 16  |
| 32 Index register L                  | CV 32=0 if accessing CVs 1 - 255. CV 31=1,2,3 if accessing CVs 257-511   | 0 - 4        | 0   |
| 48 Master Sound Select               | Selects the prime mower sound (0, 16, 32, 64), the horn (0-15), the bell (0-64), Brake Squeal Sound (0, 128) - add the numbers up for each selection to get the final value of CV 48. Will vary between sound files. Locate the sound file description on our web site for valid values. | 0 - 255      |     |
| 49 Extended Configuration #1         | 0 Disable Load control (Back-EMF)<br>1 40 kHz motor pulse frequency (internwise 20 kHz)<br>4 Enable DCC speed step detection   | 1<br>2<br>16 | 19  |
| 61 Random sound «min»                | Multiplied by 0.25 it is the time in seconds for the shortest random sound interval.   | 0 - 255      | 120 |
| 62 Random sound «max»                | Multiplied by 0.25 it is the time in seconds for the longest random sound interval.  | 0 - 255      | 200 |
| 63 Sound volume «Master»             | Master volume for all sounds.  | 0 - 192      | 192 |
| 64 Brake sound threshold «Brake On»  | If the actual loco speed step is smaller than or equals the value indicated here, the brake sound is triggered.  | 0 - 255      | 100 |
| 65 Brake sound threshold «Brake Off» | If the actual loco speed step is smaller than the one indicated here (up to 255), the brake sound will be switched off again.  | 0 - 255      | 25  |
| 66 Forward Trim                      | Divided by 128 is the factor used to multiply the motor voltage when defining motor voltage for speed steps.   | 0 - 255      | 128 |
| 67-94 Speed table                    | Defines motor voltage for speed steps.   |              |     |
| 95 Reverse Trim                      | Divided by 128 is the factor used to multiply the motor voltage when driving backwards. Value 0 deactivates the trim.  | 0 - 255      | 128 |
| 113 Power Fail Bypass                | The time that the decoder bridges via the PowerPack after an interrupt on voltage. Unit: A multiple of 0.016384 sec.   | 0 - 255      | 50  |
| 124 Extended Configuration #2        | Additional important settings for decoders   |              | 24  |
|                                      | Bit Description Value  |              |     |
|                                      | 0 Bi-directional bit: Enable driving direction when shifting direction.  | 1            |     |
|                                      | 1 Enable decoder lock with CV 15 / 16  | 2            |     |
|                                      | 2 Enable prime mover startup delay   | 4            |     |
|                                      | 3 reserved   | 8            |     |
|                                      | 4 Constant regulation frequency  | 16           |     |
|                                      | 5 Motor is switched off for a few seconds when blocked to avoid burnout  | 32           |     |
| 125 Starting voltage Analog DC       |  | 0 - 255      | 30  |
| 126 Maximum speed Analog DC          |  | 0 - 255      | 130 |
| 134 ABC-Mode „Sensibility“           | Threshold, from which asymmetry on ABC shall be recognised.  | 4 - 32       | 12  |

### Select Direct Micro Item #73199

The Select Direct Micro OEM Item #73199 was created to upgrade DC versions of Locos offering Factory ESU Sound. This board could also replace a factory equipped LokPilot Micro Direct factory equipped LokPilot Micro Direct already contain phosphor bronze pick-ups "pressure connections" for motors and sometimes speaker (mounted in the fuel tank). Simply slide the non-sound decoder or analog printed circuit board out of the frame and replace it with the 73199 decoder. If the loco was designed to be sound ready with ESU sound normally it will also use the pre-installed "SMDs" so nothing more is needed.

### Adding a speaker to an N Scale installation

Provisions may have to be taken to add a speaker to the frame as space in N Scale is very limited.

Please be careful not to short the 2 halves of the frame together as they are usually the left and right rail pick up conductors. A metal speaker touching both halves of the frame could destroy the decoder if not properly insulated.

### Warnings

- Do not expose to wet and humid conditions and Avoid mechanical force or pressure on the decoder
- Never solder on the circuit board, extend cables if necessary.
- Never wrap the decoder in insulation tape, since this may cause overheating.
- Any wiring has to be carried out while power is disconnected.
- Make sure that neither the decoder nor any blank wire ends may come into contact with the engine chassis (risk of short circuit).
- Never operate a LokSound unattended.

### Requirements for Installation

The locomotive must be in perfect operating condition prior to the conversion. Only a locomotive with faultless mechanical properties and smooth running characteristics in analogue mode is worth converting to digital. Check and replace all wear and tear parts such as motor brushes, wheel contacts, light bulbs etc., if necessary.

### Installing the Decoder

#### Select Direct Micro Item #73100

The Select Direct Micro Item #73100 Decoder will work in many brands including Atlas, Kato, and InterMountain. In order to install it into your locomotive, you need to remove the old, analog printed circuit board first.

Check the length of the LEDs for headlight and rear light first. Then, cut the length of the new LEDs that are supplied with EACH 73100 decoder and cut the terminals so that the length matches the old circuit board.

Solder the LEDs to the 73100 board and make sure you pay attention to the polarity of the LED. If desired, the original LED from the Analog could also be used. Again, please be sure the polarity is correct or the LED will not illuminate.

Figure 1 shows the general connection diagram.

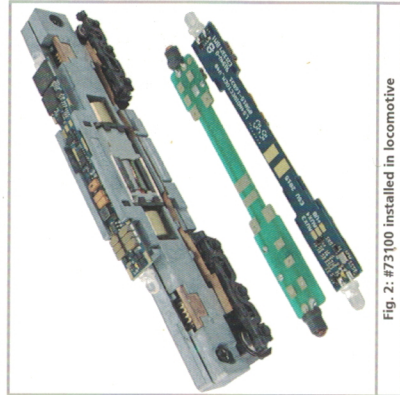


Fig. 2: #73100 installed in locomotive

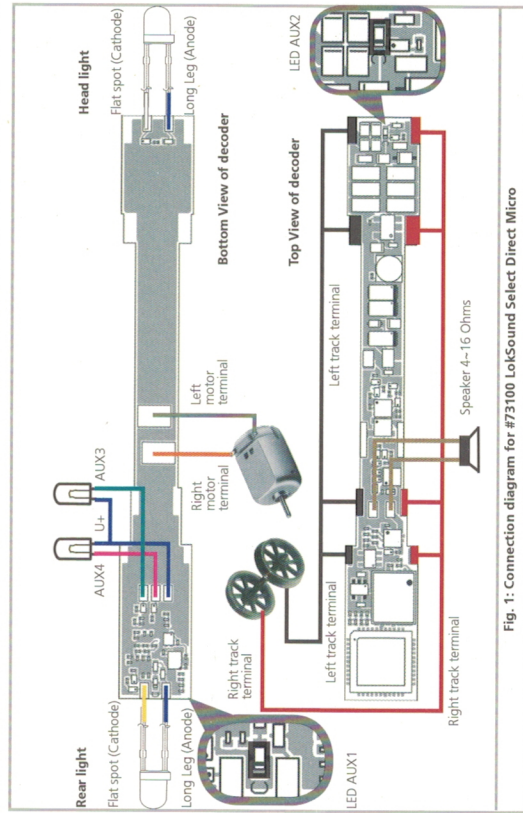


Fig. 1: Connection diagram for #73100 LokSound Select Direct Micro

### Function outputs

For AUX3 and AUX4, You can wire all kind of loads to the function outputs. However, LEDs with Resistor are recommended.

Please make sure that the load does not exceed the permitted maximum current and there are no short circuits.

If you like to use LEDs, a resistor with a rating between 470 Ohms and 2.2 kOhms need to be wired in their immediate destruction!

### DCC Operation

The LokSound works with any DCC system. Remove any capacitors that are wired into the track feeders. This could impair the functionality of the decoder.

The address is set to 03 with 28 speed steps.

### Decoder Reset

You can reset the decoder to the default settings at any time. In most cases POM programming will not work to reset a decoder. Please use a separate programming track.

Enter the value 08 into CV 08.

To complete the reset, power to the decoder must be interrupted.

### Volume Control

Master volume is controlled with CV 63. The range is 0 - 192. Individual volumes (CVs as shown) range from 0 - 128

See the full manual online at [www.loksound.com](http://www.loksound.com)

Make sure that Index CV 31 is set to 16 and Index CV 32 is set to 1 before changing a volume CV

| Function | Effect                          | Volume CV |
|----------|---------------------------------|-----------|
| F0       | Directional Headlights          | -         |
| F1       | Bell                            | 283       |
| F2       | Playable Airhorn                | 275       |
| F3       | Coupler                         | 291       |
| F4       | Dynamic Brake                   | 299       |
| F5       | AUX3 (Rotary Beacon)            | -         |
| F6       | AUX1 + AUX2 (Front Ditchlights) | -         |
| F7       | Switching Mode                  | -         |
| F8       | Sound (On / Off)                | 259       |
| F9       | Drive Hold                      | -         |
| F10      | Locomotive (Independent) Brake  | -         |
| F11      | Radiator (Fan) Sound            | 315       |
| F12      | Dimmer (Headlights)             | -         |
| F13      | AUX4 (Rear Ditchlights)         | -         |
| F14      | -                               | -         |
| F15      | Fast Spitter Valve              | 371       |
| F16      | Spitters on Shutdown            | -         |
| F17      | Brake Set / Brake Release       | -         |
| F18      | Sanding Valve                   | 355       |
| F19      | Short Air Let Off               | 363       |
| F20      | Compressor                      | 307       |
| F21      | Slow Spitter Valve              | 387       |
| F22      | Air Dryer                       | 427       |
| F23      | -                               | -         |
|          | Random Sounds                   | 461       |
|          | Brake Squeal                    | 459       |

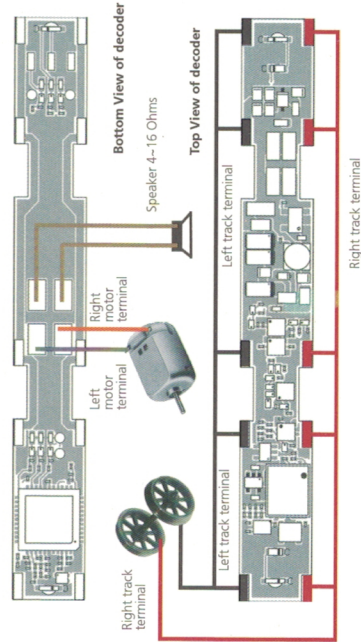


Fig. 3: Connection diagram for #73199 LokSound Select Direct Micro «OEM»