LocoServo
 User Manual

HDM12

LocoServo Module

This module is a variant of LocoIO. The module can drive 8 analog Servo engines with 2-positions or 4 Servo engines with 4-positions and also includes a LocoIO 4 bits input/output.

- For the 4 bits input/output, see LocoIO user manual.

- The Servo engine can turn in an angle of 90º from Position 1 = 1 to Position 2 = 127. Position 1 and Position 2 can be set within that 90º angle, with a value of 1 to 127. The Servo engines are transferred from one position to the other by means of a "Fixed Contact" report. The transfer can be done at 4 different speeds, and each servo can be set separately. Speed = 0 is the fastest, Speed = 3 is the slowest.

- The Servo engine can also perform an ongoing back and forth movement with two different speeds, when the Speed = 4 or 5. In that case, Position 1 is permanently fixed on value = 1. Position 2 can be chosen freely between 1 and 127, and will determine the angle of the movement.
The "Fixed Contact" report determines whether the servo goes back and forth between Position 1 and Position 2 or stays on Position 1.
Continue ongoing back and forth movement is not selectable with selection of 4-position Servo.

With the Servos points/switches, mechanical signals, level crossing barriers, doors of locomotive hangars, etc. … can be operated.

Driver module connection:
The Connection with Loconet and between LocoServo and Driver Modules is with a 6-wire cable with RJ12 connectors. It is important that on both ends of the cable pin1 on the first connector is connected to pin1 on the second connector.
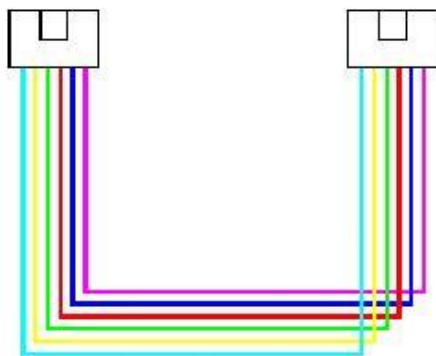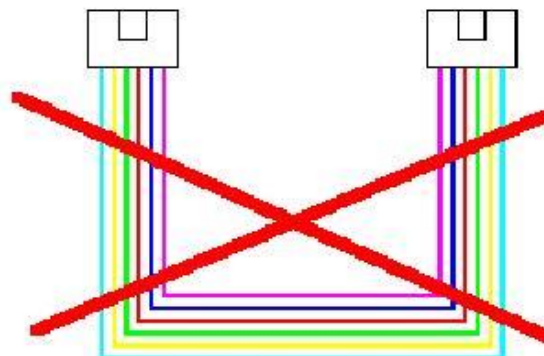

Correct   **Wrong**

Bill of materials for the LocoServo module 2.0:

UT_DEVICE	UT_VALUE	Refdes
Voltage Regulator	7805	U4, U5
Diode	1N4001	D3, D5
Capacitor	100nF	C2, C5, C6, C7
Capacitor	15pF	C3, C4
ELCO	100µF/25V	C1
ELCO	220µF/25V	C8
JUMPER2	2-pins	JP1, JP2, JP3, JP5
HDR_3	3-pins header	JP11, JP12, JP13, JP14, JP15, JP16, JP17, JP18
Connector	RJ12	J1, J2, J4
Connector	4 pins print connector	J3
LED	Green Ø3mm	D1, D4
LED	Red Ø3mm	D2
NPN transistor	BC337	T1
PIC IC	PIC16F648A-I/P (LS104)	U1
PIC IC	PIC16F628A-I/P (SRV001)	U2
Comparator IC	LM311N	U3
Resistor	10kΩ	R4, R10, R11, R12, R13, R14, R15, R16, R17
Resistor	150kΩ	R6
Resistor	1kΩ	R1, R8, R9
Resistor	220kΩ	R2
Resistor	22kΩ	R3
Resistor	47kΩ	R5
Resistor	4k7Ω	R7
XTAL	Quartz 20MHz	X1
Cool plate	for TO-220 housing	S1
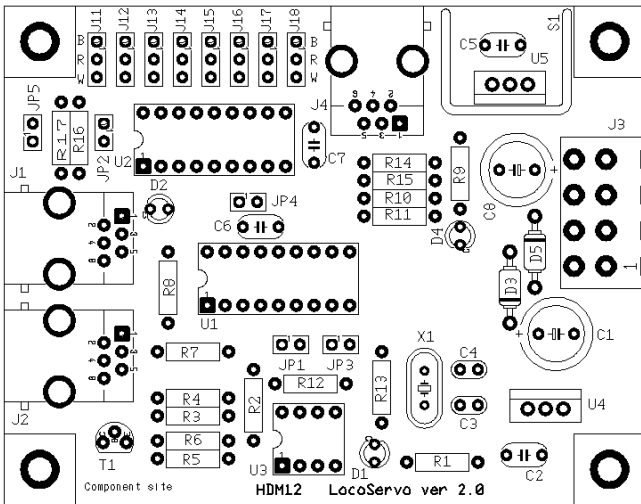
Jumper setting:

| JP1 | Off | Input status on power up and after a Loconet disconnection. |
| | On | Without input status |

- User of a Digitrax Command Station DB150 need to set JP1 On.
- For users of the module with Command station and/or PC it is better to set JP1 On.
- With a PC it is advisable to read the status of the inputs with the command OPC_GPON.
- JP1 Off is for users without PC, to set the LED's on the panel in the correct status at the moment of start-up.

| JP2 | Off | The Servo engine is always assisted |
| | On | The Servo engine is only assisted for 5 sec after a new command has been given. |

- When adjusting the drive it is advisable to keep power on the Servo motor.
- Afterwards it is better to put JP2 in closed position. The power supply on the LocoServo is less charged because of this. The Servo motor has with his gear box sufficient force to keep the points in position.

| JP3 | Off | Normal connection to Loconet. |
| | On | No connection with Loconet. |

- When JP3 is On, there is no connection to Loconet. In that case the module is completely independent.
On J4 you will automatically have 4 inputs, where 4 switches can be connected to GND.
These serve 4 Servo motors, which are respectively connected to J11 to J14, with the position1 and position2 values. These values need to be written earlier in the module with the LocoIO Configuration program.

| JP4 | Not used |
| JP5 | Reserved for later use |

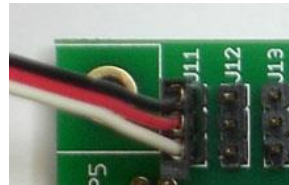## Power connector J3 possibilities:

Input:	Output:
Pin 2: 12V - 15V DC input	Pin 1: 5V output
Pin 4: GND input	Pin 4: GND output

IO connector J4:

Pin 1: +5V
Pin 2: IO-4
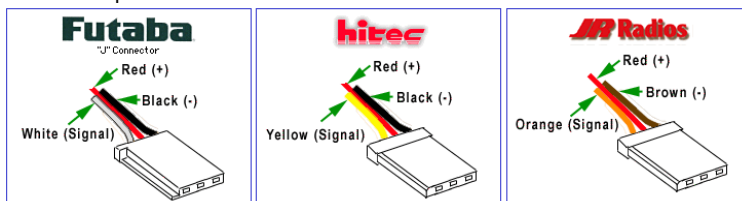Pin 3: IO-3
Pin 4: IO-2
Pin 5: IO-1
Pin 6: GND

Servo connectors J11, … , J18:

Pin1: GND
Pin2: +5V
Pin3: Signal

! Do not make wrong connection or the PIC can be damaged.
With 4-positie Servo the connectors J12, J14, J16 and J18 are **not** used.

Some examples:

Red LED:

| On | No central station connected or current source on Locobuffer selected or JP3 On, and Loconet has been disabled because of this. |
| Off | Loconet OK, no activity |
| Blinking | Loconet command transfer |

Green LED Power OK

Remarks:
- Every IO pin as output can give max. 20mA.
- With a DC power supply the GND is the same as with an Intellibox or Locobooster.

Software remarks:
- With an OPC_GPOFF or OPC_IDLE Loconet command, the current Servo motor positions will be written in a "Power up memory".
These positions will be used at the power up of the LocoServo module.

LocoHDL Configuration for LocoServo Module
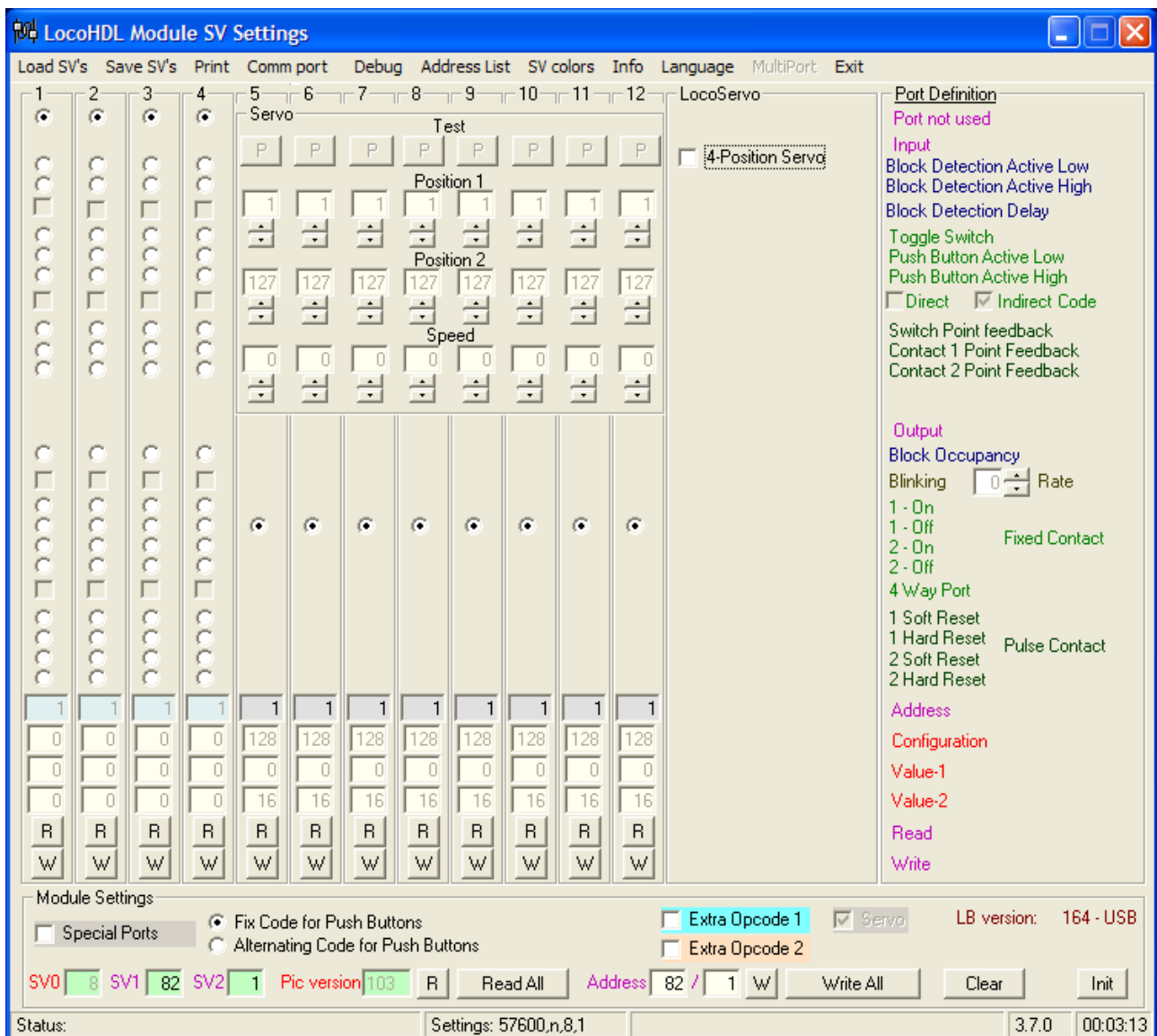
In terms of functionality the first 4 ports are identical to a LocoIO.

Adjust:

Fill in the addresses of the switch with which the Servos will be controlled.
Set Position 1, Position 2 and a speed.
Write these in LocoServo with the "W" button or "Write All" button.

Both positions can be tested with the test buttons. If necessary change the angle by placing another value in Position 1 and/or Position 2. Each time one value is changed, you must press the"W" button before doing a new test.

RECOMMENDATION:
- If the used version of LocoServo has not the option selection "Port not used", then it is been advised to define unused ports as output ports, and give them an unused address. Then you prevent that interference on the module will send out undesirable codes on Loconet.
- Give ports used as Servo output, always an address that occurs only once at a module.

Example: 4-positie Servo to work mechanical signals.

The Servo to J11 have as Position1 = 1, Position2 = 60, Position3 = 81, Position4 = 127, speed = 0
Addresses used for the operation are 100 and 101.

The Servo to J13 have as Position1 = 1, Position2 = 40, Position3 = 76, Position4 = 127, speed = 1
Addresses used for the operation are 102 and 103.

The Servo to J15 have as Position1 = 1, Position2 = 64, Position3 = 64, Position4 = 127, speed = 2
Addresses used for the operation are 104 and 105.
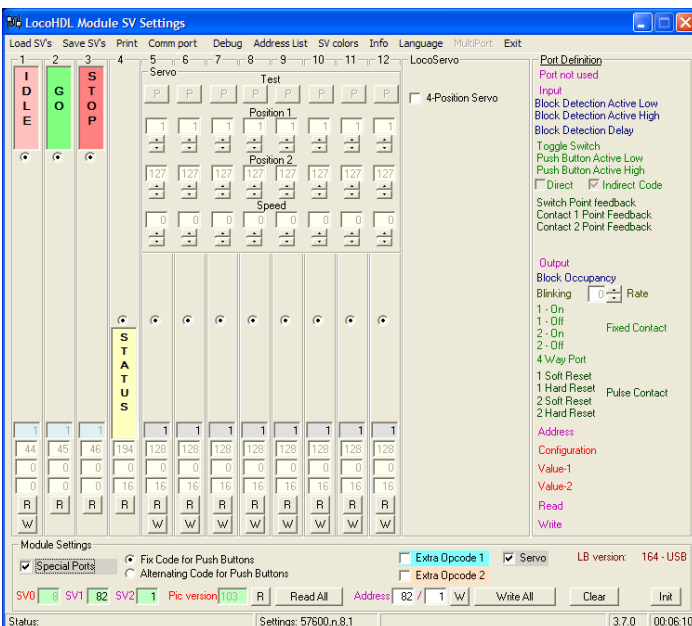Here it concerns 3-position signal Position2 = Position3.

The Servo to J17 have as Position1 = 1, Position2 = 127, Position3 = 47, Position4 = 102, speed = 3
Addresses used for the operation are 106 and 107.
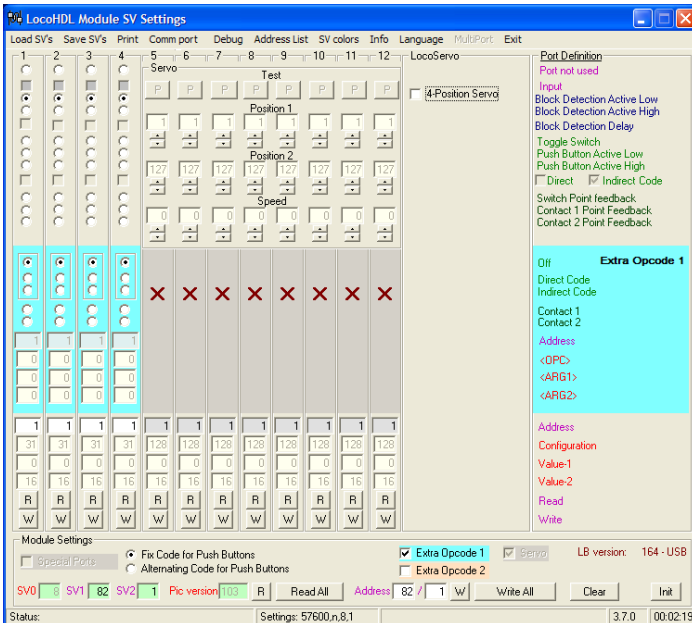
The LocoServo also has an "Extra Opcode" setting
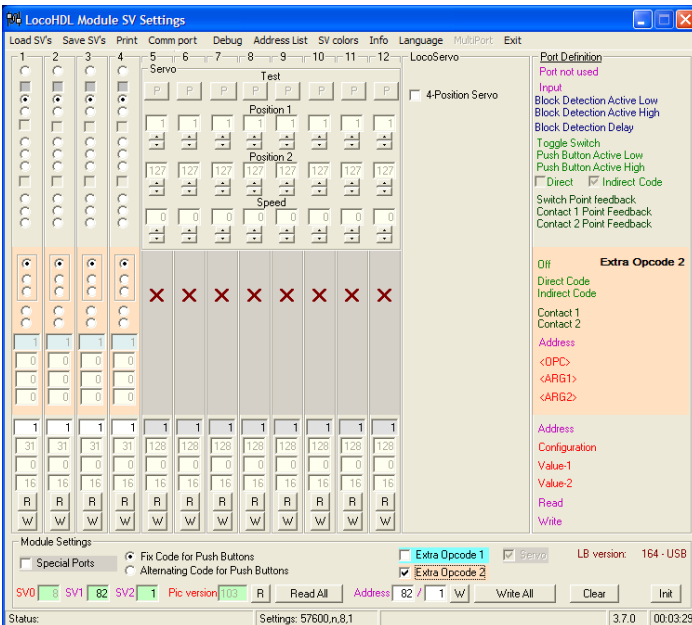
As from LocoServo Software version 103 you have also "Extra Opcode 2" possibility.

As from LocoServo Software version 103 you have also a "Special Ports" possibility.

Further information about this can you find in the LocoHDL configuration manuel.

History of the hardware versions

Version 1.0
- Start version

New in version 2.0
- Adaptations in the power circuit for better stability

History of the software versions

Version 101   (LS101 + SRV001)
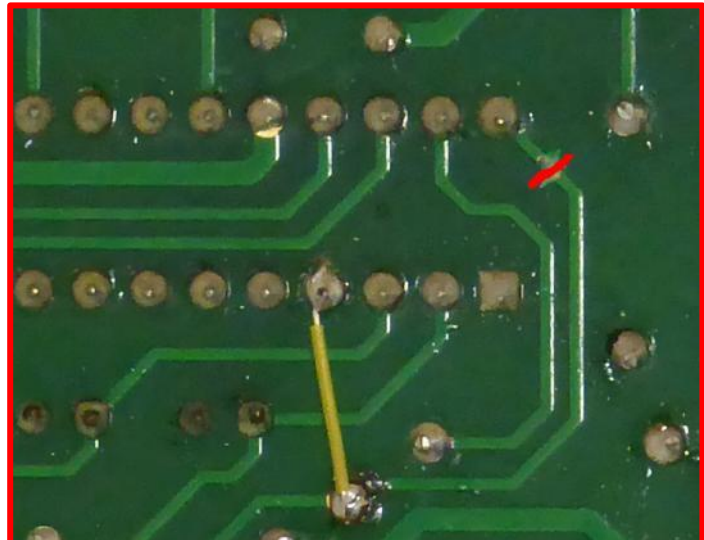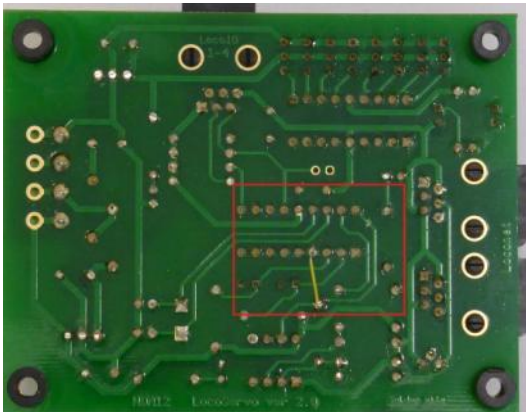- Start version

New in version 102
- New bigger PIC for U1 - PIC16F648A (the PIC16F628A was too small for this version)
- 4-position servo

New in version 103
- Extra Opcode 2
- Special Ports for GO-IDLE-STOP inputs and STATUS output.

Version 2.0 conversion to Version 4.0

1) Interrupt 1 copper connections with a sharp knife (red in the picture)

2) Solder one wire (yellow in the picture)

3) Replace PIC LS10x by LS105 or higher and SRV001 by SRV005