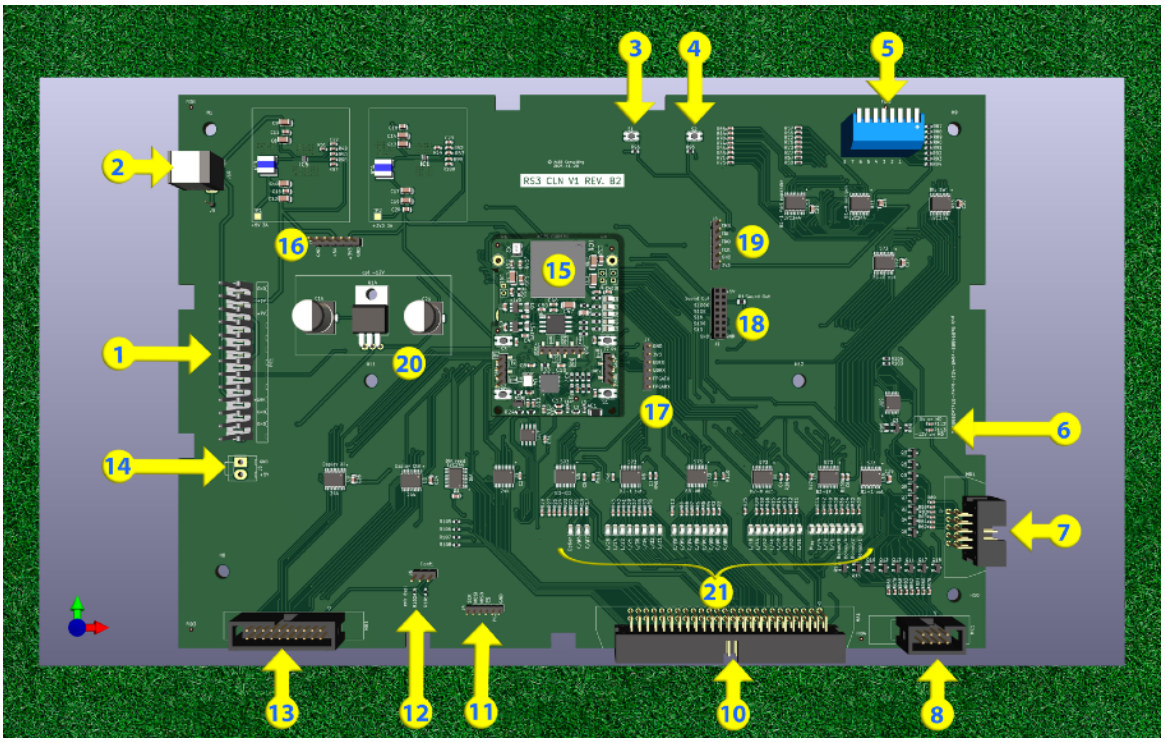


MPU RECEL SYSTEM III CLONE. Notice of installation

Installation

RS3CLN is an exact replica of the original Recel system III MPU which is used in several Recel pinballs from the 70's. Dimensions, connections, timings are totally indistinguishable.

Since RS3CLN is identical to the original Recel MPU in every aspect, the installation is straightforward.

Just follow the few steps below, and that's it.

1. Locate the old MPU board in the lightbox. Disconnect the 3 connectors PC (Power), MA (interface to mux board) and MB (display board). Please, note the orientation of these connectors. Original connectors do not always have polarisation notches, or pins, and could be mistakenly reinstalled in reverse orientation.
2. Remove the metallic backbone+MPU board from the pinball machine.
3. Unbolt the power transistors that are attached to the metallic backbone.
4. Unscrew the 4 spacers which maintain the old board to the metallic backbone
5. Then install the new clone MPU. You will reuse the spacers to attach the new MPU to the metallic backbone. There is no more power transistor to bolt to it, so the operation is simple.
6. Then you can reinstall the assembly in the lightbox.
7. Reconnect the 3 connectors in the same way as they were originally. You should always check that the +10V power supply from the power supply board is present and has the correct value. Please, note that the RS3CLN is not protected against reverse voltage. Always, check your connectics. RS3CLN will work correctly with its theoretical 10V power input in the range [7.5V, 15V].It is therefore very tolerant.
8. That's it. You are ready to go. The MPU will run the preconfigured game variant you asked for at purchase, or « Crazy Race » by default if you did not request anything.
9. Use the WiFlip web interface to change the game variant, system settings, specific game settings, etc…

Callouts

Callout	Description	Callout	Description
1	PC connector. From cabinet's power board	12	Optional multipurpose IO (3V3)
2	[+8V..+12V] standalone power supply	13	MB connector. From display board.
3	S1. Not always mounted pushbutton.	14	Optional 5V supply
4	S2. Pinball reset (long press)	15	Core80 minicard. Spartan 7 core board.
5	8-Dip switches. Not used yet.	16	Power good test connector.
6	Select voltage on MD pin 8 (0 or –12V)	17	UARTs alternate access (ESP8285, FPGA)
7	MD. Miniprinter interface	18	Optional sound board interface
8	MC. Port expander.	19	FPGA JTAG connector
9		20	Optional -12V power reg. Not mounted.
10	MA connector. Interface with Mux board.	21	Output LEDs. Lamps+Coils.
11	Optional connection to SPI or I2C		

PC Connector

PC Connector	Pin#	Type	Label	Comment
	1	In/ out	GND	0V DC connection to display control (DE pin 10)
	2	Out	+5V	+5V to power supply of display control (DE pin 11)
	3	Out	+7V	+7V DC to display control (DE pin 8) (*)
	4	Out	GND	0V DC to display control (DE pin 9)
	5	Pol		Polarity connection. No pin
	6	In	GND	0V DC from power supply (PC pin 6)
	7	In	+7V	+7V DC from power supply (PC pin 1) (*)
	8	Out	Out sound	Play tones. To be sent to an amplifier (5V, max 100mW)
	9	Out	Play signal	Turns the playfield on (coils, lamps, flippers)
	10	In	+10V	Power source of RS3C MPU. Operating range [8V, 12V] (**)
	11	In	GND	
	12	In	GND	
	13	In	-18V	Not connected on the clone. No use. (***)

* PC pins 3/7 form a bridge to forward +7V DC from power supply board to display unit. +7VDC is not used on the MPU board, except that +7VDC is made available on pin 10 of connector MD (mini printer connector)
** Power supply is Not protected against voltage inversion. Absolute maximum rating: +18V
*** -12V power supply is drawn on the PCB, but corresponding components are not mounted (U14, C16, C21). This circuitry might be required in case of use of the mini printer because on the original MPU, Pin 8 of MD is connected to -12V. This characteristic has been replicated on the clone, in case of necessity. R112 or R113 are 0R 0603 resistances. Mount R113 to have -12V on MD pin 8 or R112 to just have 0V on MD pin 8.

Power inputs are **Not** protected against voltage inversion. Check voltage values on every power pins of the feeding connector before powering the board.

A DC power jack is provided on the upper left corner of the mother board. Any 3A DC power source between 8V and 12V can be used. +V on the central pin, GND on the outer contact.
This power source is to be used for test bench only, with the RS3CLN in stand alone mode.

Main causes of problems and solutions

The electronic of Recel system III pinball machines is made of 4 boards :

1. RS3CLN is a clone of the original MPU control board. Located in the lightbox.
2. The power supply (in the cabinet) gives +10VDC, +7.5VDC, +7VDC, +44VDC, -18VDC, 5VAC, 6.3VAC. The power board also ensures the sound play, and play a big role in short circuit and open circuit diagnostics of coils. (Big resistance of 39 Ohms)
3. The Mux board in the cabinet, manages the lamps and coils outputs. It is controlled by the MPU, which provides the +5VDC to it.
4. The display board, in the light box manages the displays. Its +5VDC power source is the MPU board as well.

The first thing to do is to check the power supply voltages from the power board.. With the clone, the -18VDC source is no more required. The others are.

Display problems.

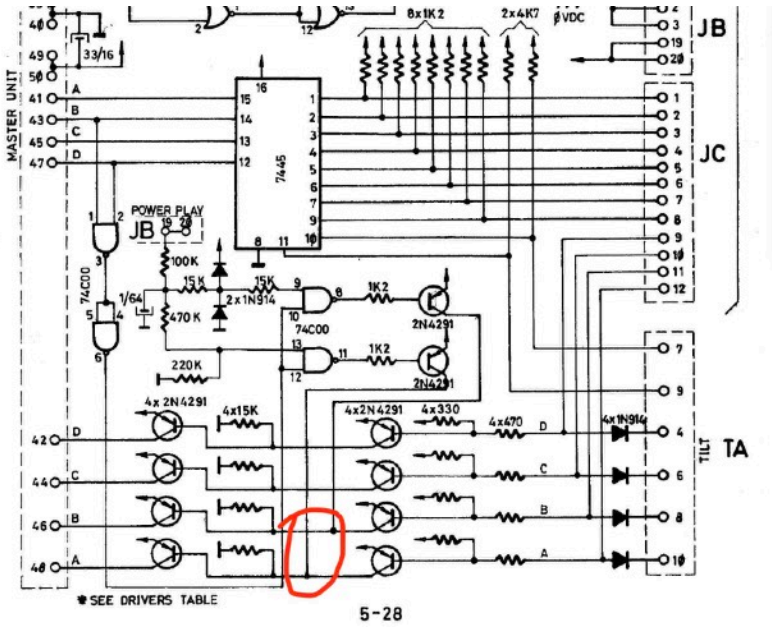
It often happens that particular segments stay on or off for all digits on the displays. 99% of time, the problem comes from A6, B6 on the display board. These are transistor arrays CA3081. They are ordinarily the first culprits. Of course, always check your connectics. That is an important source of problems.

Mux board problems.

At every power up, the pinball starts a self-checks sequence. After approx. 1 minute, it enters attract mode (except Screech, whose ready state is just every lamp of, which is a bit deconcerting). The machine is ready for a game to be played.

There are few fatal errors (typically short circuit on a coil). In such situation, the pinball halts there and freezes with the error code of the cause displayed on the display 2.

2.4.5. FOREVER



2.4.5. is considered by the system as a major fault, which means that the pinball will halt, when it detects this error. 2.4.5. is caused by a "SHORT IN DRIVER". In general, this comes from a burnt coil, power transistor, or both. But sometimes, after checking all coils and transistors OK, the error

2.4.5. is still there. In such a case, the problem could come from the short/open test circuitry which resides in the mux board. Mux board switch matrix control schematic This part of the Mux board often fails. That might be the 7400 or the 7445. But it is also worth it checking the 10x2N4291. A dead component here may distort the return values of the switches on AB return lines. Then, an accidental 2.4.5 may result. Always check the 7400 and the 7445, when you get a machine that was previously in an unknown condition. Also check the flat cable on MA and make sure connections are good.
⚠Take care when replacing the 74C00. You need to install a 74C00 (difficult to find), or possibly a 74HC00. But don't use an LS00. It will not work.

FLICKERING DISPLAY
Sometimes, after entering attract mode, the displays are flickering 44444/00000 on all 4 players. The selftest has completed successfully. But the pinball is out of control. Pressing the replay button has no effect. in 90% of cases, this is caused by at least "tilt" and "replay" switches simultaneously seen (by MPU) as closed together. The pinball then thinks it is entering "open coin door" mode and starts to display representation areas. By construction, it starts with area #4. and since replay button appears to never being released, the display alternates showing area number (4) and its content (0). And it cycles forever between these 2 screens, since no switch looks to be released.
This means that the switch matrix control circuitry on the mux board is wrong and that several lines are locked up.
Culprits are generally the same (mainly on returns A&B) as in '2.4.5. forever'