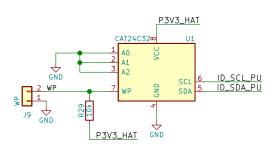
40-Pin HAT Connector

			40HAT	J3		
		× 1	P3V3	P5V	2	P5V_HAT
	I2C_SDA	^ 3	BCM2	P5V	4	P5V_HAT
	I2C_SCL	5			6	GND
		× 7	ВСМ3	GND	8 ×	
	GND	× 9	BCM4	BCM14	10 ×	
	014D		GND	BCM15	12 X	PCM_CLK
		× 11	BCM17	BCM18		
		×13	BCM27	GND	14	GND
		× 15	BCM22	BCM23	16 ×	
♦	P3V3_HAT	<u>^17</u>	P3V3	BCM24	18	INT_U8
~	SPI_MOSI	19	BCM10	GND	20	GND
	SPI_MISO	21	BCM9	BCM25	22	INT_U9
	SPI_CLK	23	BCM11	BCM23	24	SPI_CS_U8
	GND	25	GND		26	SPI_CS_U9
	ID_SDA	27		BCM7	28	ID_SCL
		× 29	ВСМ0	BCM1	30	GND
		X 23	BCM5	GND	32	PWM0
	DV/444	× 31 33	ВСМ6	BCM12	34	GND
	PWM1		BCM13	GND		GND
	PCM_FS	35	BCM19	BCM16	36 ×	
		× 37	ВСМ26	BCM20	38 ×	
	GND	^ 39	CND	DCM24	40 1	PCM_DATA

HAT ID-EEPROM

The HAT spec requires this EEPROM with system information to be in place in order to be called a HAT. It is set up as write protected (WP pin held high) and can be enabled for writing by placing a jumper on J9 or by bridging TP1.

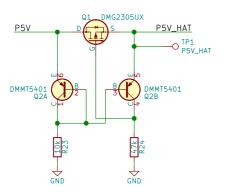




5V Powered HAT Protection

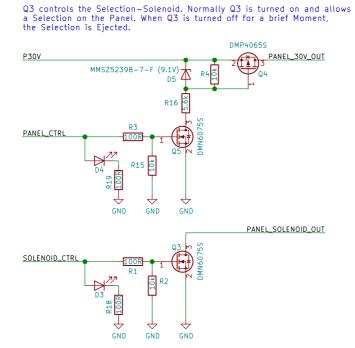
This is the recommended 5V rail protection for a HAT with power going to the Pi.

See https://github.com/raspberrypi/hats/blob/master/designguide.md
#back-powering-the-pi-via-the-j8-gpio-header



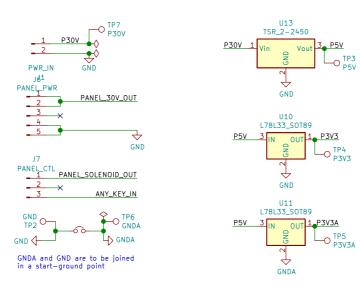
Panel Power Switching

The Panel's Solenoid and Bulbs are driven from 30V.
During Standby the RaspberryPi turns of the Panel via Q4 and Q5.
D5 limits the Vgss of Q4 to 9.1V and R16 the Current across D5 to around 5mA.

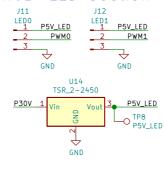


Power Section

The Hat is powered from an external 30V 2A Power-Brick.
P30V is directly switched to the Panel's Solenoid and Light Bulbs through Q4.
P5V is generated from P30V by U13 and passed to the RaspberryPi through the
Protection Circuit around Q1.
P3V3 is generated from P5V5 by U10 for all the local, digital ICs.
P3V3A is generated from P5V5 by U11 for the Analog Portion of the Audio DAC U12.
GND and AGND is joined in a Star-Grounding-Point to minimize Crosstalk from the Digital
to the Analog side.



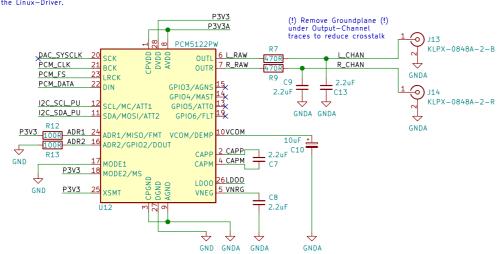
RGB-LED Section



Audio Connector

Audio DAC

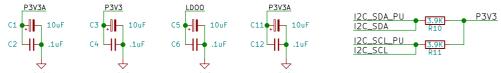
The System—Clock SCK is generated with a PLL internally from PCM_FS. Alternatively one could add 2 extra Oscillatory to enhance the frequency stability. They are controlled by GPIO 3/6 from the Linux—Driver.



Mounting Holes

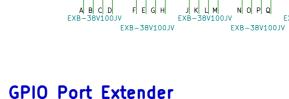


Decoupling between Decoupling between Decoupling between DVDD / DGND DGND DGND DCOUPLING DECOUPLING BETWEEN DECOUPLING BETWEEN



Panel Connectors & Input-Protection

All Inputs are equipped with 3.3V Transient Suppression Diodes and series resistors to protect against ESD and inductive coupled Transients to support the the long cable runs and close high-current solenoids and incandescent bulbs. P3V3 2 B_IN 3 C_IN 4 D_IN 5 E_IN 6 F_IN CM1293A J4 G-1^M G_IN 2 H_IN 3 J_IN 4 K_IN 5 L_IN 6 M_IN P3V3 P3V3 CM1293A N_Q N_IN 2 O_IN 3 P_IN 4 Q_IN P3V3 P3V3 2 3_IN 3 4_IN



2 7_IN 3 8_IN

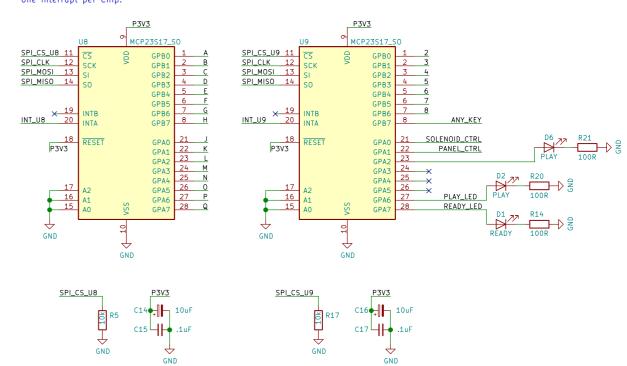
ANY_KEY_IN

Two MCP23S17 (SPI 16bit Port Extender) read from the Panel-IOs and to drive the FETs which control the Panel-Power. Q8 and Q9 each have their own Chip-Select and Interrupt-Line. The Interrupt-Mirror-Feature is used, to only have one Interrupt per Chip.

CM1293A

EXB-38V100JV

P3V3





	Sheet: / File: _autosave-pi-hat.sch						
	Title: Raspberry Pi HAT						
	Size: A2	Date:	Rev: B				
	KiCad E.D.A. ee	eschema 5.1.5-52549c5 84 ubuntu19.10.1	ld: 1/1				
_	10	11					