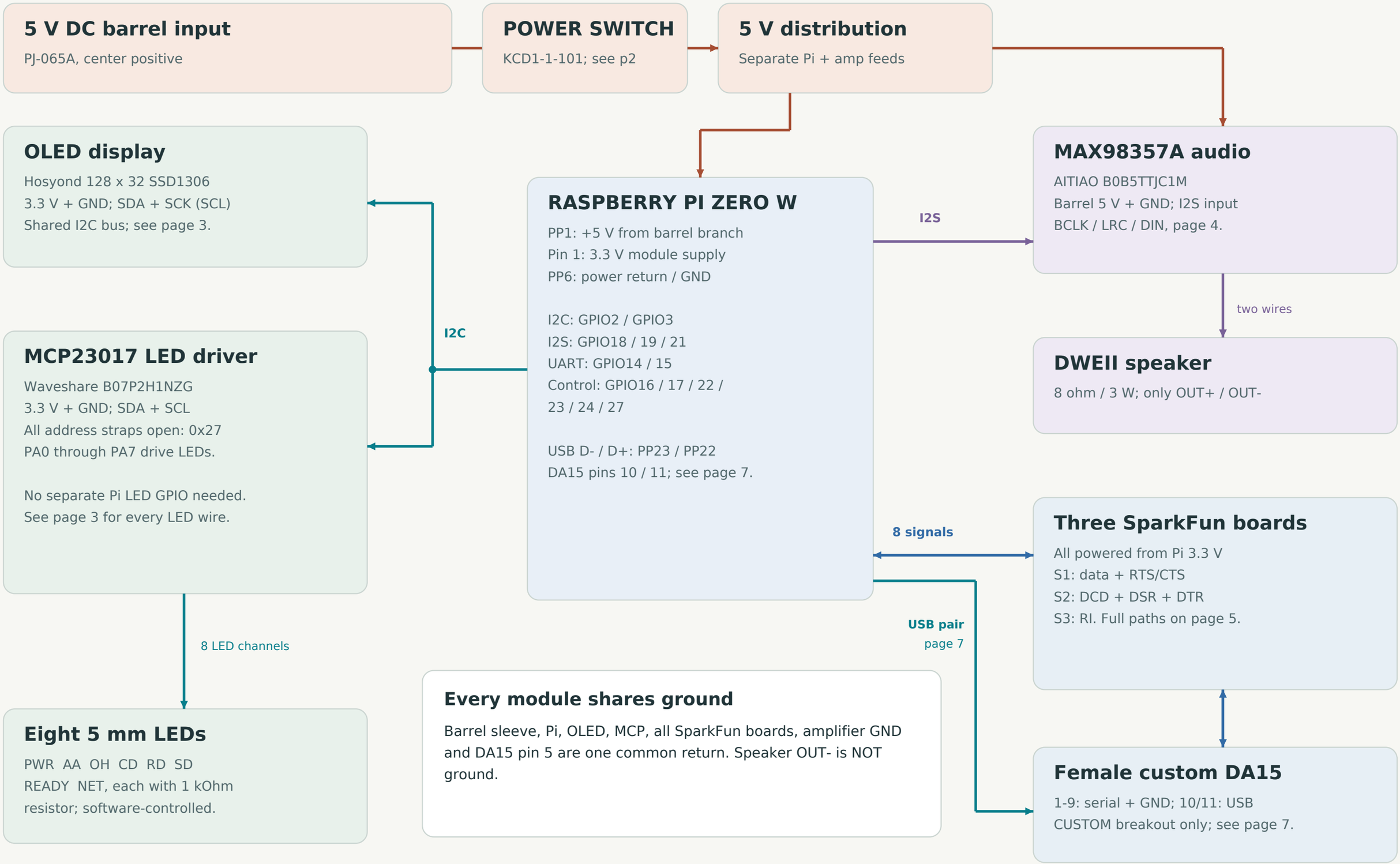
Netstalgia complete wiring overview

Original Pi Zero W, E24 display/audio wiring, three SparkFun BOB-11189 boards and a female solder-cup DA15.

CONCEPT REVISION: USB POWER / VBUS REVIEW STILL REQUIRED

Use the detailed sheets, match the actual board labels, and resolve the checks before powering. GPIO and LED assignments require firmware.



Pages 2-4 add the complete power, display, LEDs and audio connections. Pages 5-6 cover serial and connector orientation; page 7 adds USB. Boxes here are functional, not physical pin layouts.

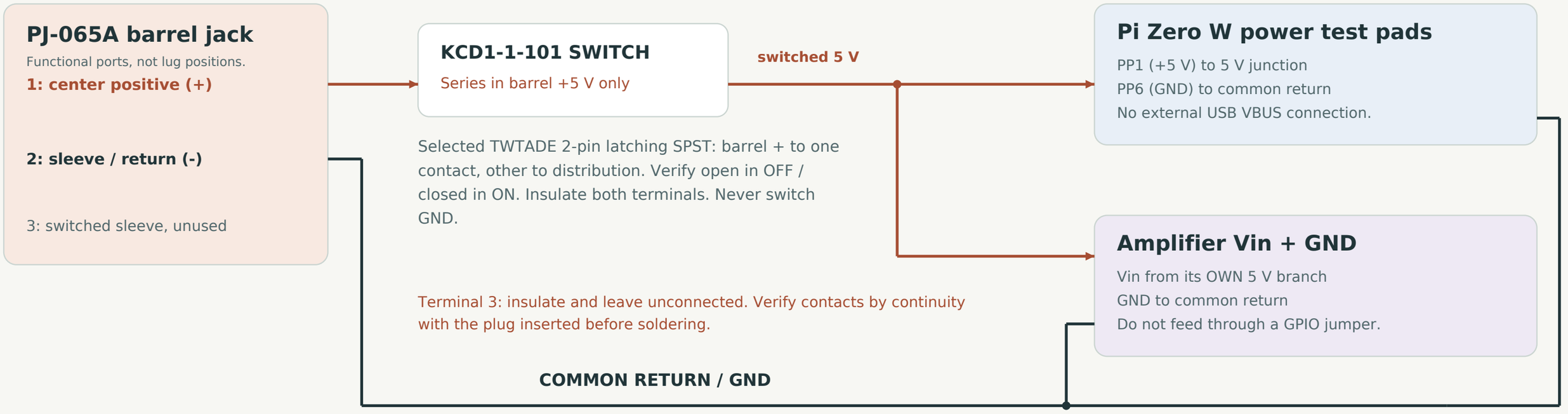
Never join host USB VBUS to barrel 5 V. Shared GND required; page 7. No added fuse, polarity, overvoltage or backfeed protection.

Power and the shared ground

Keep the mains supply outside the case. Use regulated, protected 5 V DC, center positive, with a compatible 5.5 / 2.1 mm plug.

UNFUSED HARNESS: NO ADDED OVERCURRENT PROTECTION

The wiring has no overcurrent, reverse-polarity, overvoltage or USB-backfeed protection. External supply protection does not qualify the harness.



The Pi supplies a separate 3.3 V rail

Pi physical pin 1 (3V3) → SparkFun S1 / S2 / S3: JP2-5 (3V-5.5V)

OLED VCC; MCP23017 VCC; LED resistor rail

Five serial pull-ups and S3 unused T2IN

Pi pin 6 (GND) → All module GNDs + DA15 solder cup 5 -> common return.

Do not tie 3.3 V to 5 V.

Switch rating / shutdown

Selected TWTADE KCD1-1-101, ASIN B0CVTRKJTV. Published AC ratings do not establish its 5 V DC current or inrush rating. Confirm DC suitability for the entire load before power. This concept is NOT electrically qualified; no inline fuse is added.

Shut Linux down cleanly and wait for completion before switching OFF. A hard cut during writes can corrupt storage. This is not a software shutdown button; no latching or shutdown-controller circuit is implemented.

Switch OFF must open barrel positive; GND stays continuous. Other connected power can defeat OFF. Keep all USB VBUS isolated; verify no backfeed.

USB and first-power checks

W6A proposes barrel-only power and a USB data pair through DA15. PC VBUS stays isolated; never join it to PP1 or the 5 V rail. Data-only operation is NOT validated: host-presence sensing and disconnect behavior need design review before connection.

With every supply disconnected, check polarity, shorts, insulation and strain relief. Commission in stages with a regulated, current-limited 5 V source. Measure voltage at Pi/amp and temperatures under load.

OFF isolation, switch inrush/temperature and full-load behavior are untested.

PJ-065A contact drawing

Pi Zero back-powering / no isolation diode

Selected switch: TWTADE B0CVTRKJTV (rating verification pending)

Original Zero W schematic: PP1 = 5 V; PP6 = GND

Raspberry Pi power guidance

OLED and all eight front LEDs

Use the 3.3 V rail and common ground from page 2. MCP LED assignments below are proposed and must match the emulator.

One shared I2C bus, two devices

PI ZERO W		HOSYOND OLED		WAVESHARE MCP23017
3V3 / pin 1	———	VCC	———	VCC
GND / pin 6	———	GND	———	GND
GPIO2 / pin 3	———	SDA	———	SDA
GPIO3 / pin 5	———	SCK (I2C SCL)	———	SCL

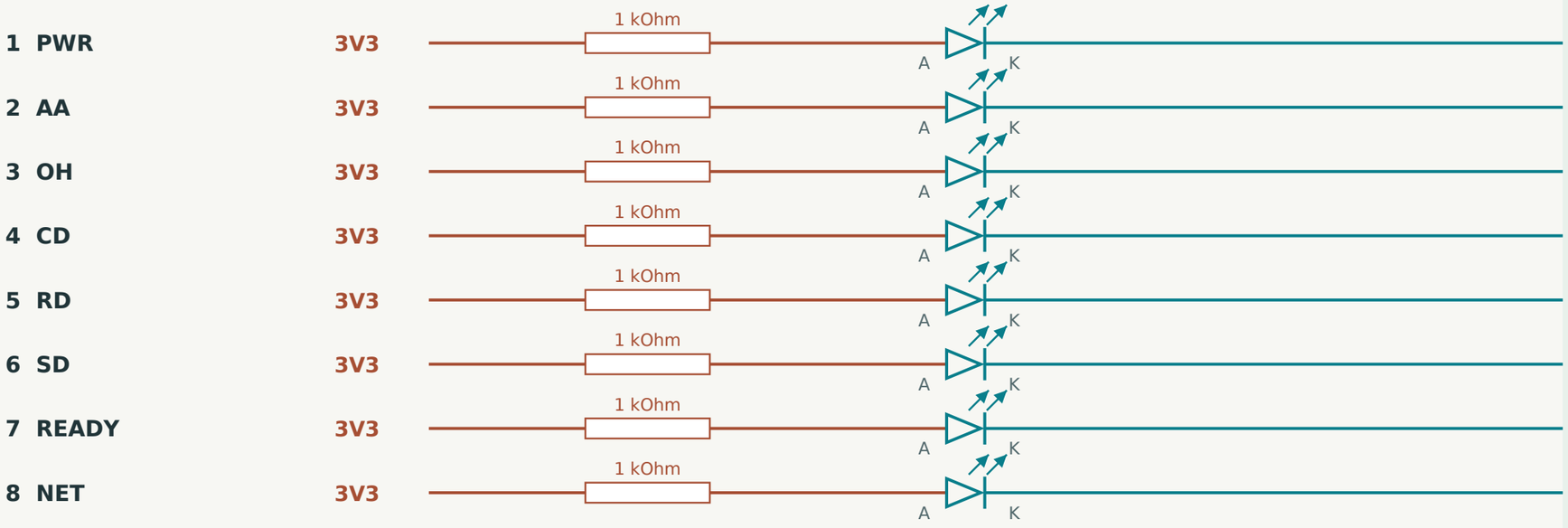
Connections are common nets, not connector positions. Match the silk labels; OLED SCK means I2C clock here, not SPI.

MCP address: leave A0, A1 and A2 straps OPEN for 0x27. Closing all three selects 0x20. The Waveshare board already has reset bias and 10 kOhm SDA/SCL pull-ups to VCC; no extra reset wire is specified. Address straps are not PA0-PA2 LED pins.

OLED address is expected 0x3C, but confirm the actual device response. No I2C pull-up may exceed 3.3 V. Extra module pull-ups are in parallel; confirm bus levels rather than adding more by default.

Eight separate LED circuits

Viewed from the front, the retained labels run left-to-right in the order below. Do not connect LED pins to DA15 signals.



MCP23017 outputs

- PA0 (chip GPA0)
- PA1 (chip GPA1)
- PA2 (chip GPA2)
- PA3 (chip GPA3)
- PA4 (chip GPA4)
- PA5 (chip GPA5)
- PA6 (chip GPA6)
- PA7 (chip GPA7)

Active LOW: PAx sinks current to turn the LED on. BANK=0: set OLATA=0xFF before IODIRA=0x00. PWR is software-lit, not a raw-power lamp.

Waveshare MCP23017 board / schematic

Hosyond exact board photograph

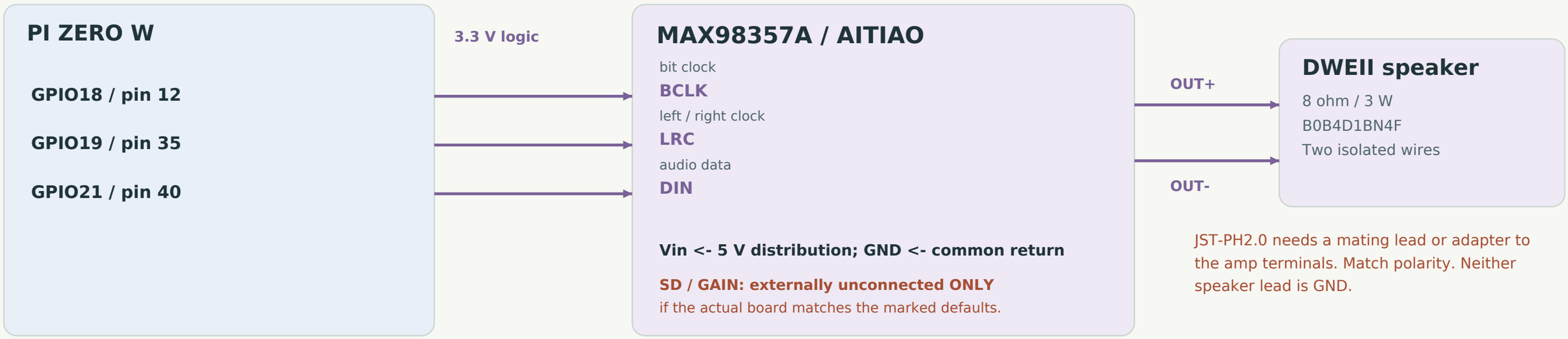
Microchip MCP23017 datasheet

Audio and final checks

The amplifier takes I2S digital audio from the Pi. Its speaker outputs are a bridged pair, neither is ground.

ACTUAL BOARD MATCH REQUIRED

AITIAO seller photos establish the labels/defaults below. No manufacturer schematic for this exact breakout or physical-board check is available.



Match the amplifier board before using its defaults

Seller photo: component side upright, speaker pads at top, header left-to-right = LRC, BCLK, DIN, GAIN, SD, GND, Vin. Speaker pads are minus left, plus right. Match labels on the actual board, not just the position.

The pictured back says "Default 9db Gain & (L+R)/2 out". Leave GAIN and SD externally open only for that matching board. If different or unmarked, STOP and verify its circuit. Do not connect SD to a Pi GPIO on assumption; a pull-up may use 5 V.

No MCLK wire is needed. Verify I2S driver configuration and playback on the fitted build. Start with low software volume; this plan does not guarantee pop-free or muted startup.

LED and I2C checks

The conservative 1 kOhm values give about 1.1-1.5 mA for typical red LEDs. Current and brightness depend on the actual LED; test before changing values. Each LED gets its own resistor.

Anode A is usually the longer lead; cathode K often has a flat on the package. Confirm with a meter, especially after trimming. A/K are electrical polarity, not mounting direction.

Cold reset leaves LED output drivers high-impedance. A warm Pi reboot may preserve old LED states. Initialize all LEDs. Leave PB0-PB7/INTA/INTB unwired; configure PB7 as an output per the current datasheet. Configure other spare inputs deliberately.

Before any powered test

1. Match OLED, MCP, amp and serial board labels to these sheets. Resolve any mismatch first.
2. Power off: inspect shorts, polarity, resistor values, speaker isolation, insulation and strain relief.
3. Use staged current-limited 5 V bring-up, with PC serial cable disconnected. Verify 3.3 V rail and I2C levels.
4. Configure I2C, I2S and UART; implement the GPIO/LED map. Check actual controls and boot behavior before the PC.
5. Measure total load and hot spots. Wiring/cable current ratings, firmware and thermal behavior are not qualified.

Exact AITIAO amplifier photo

MAX98357A manufacturer datasheet

DWEII exact speaker listing

Original Zero W header schematic

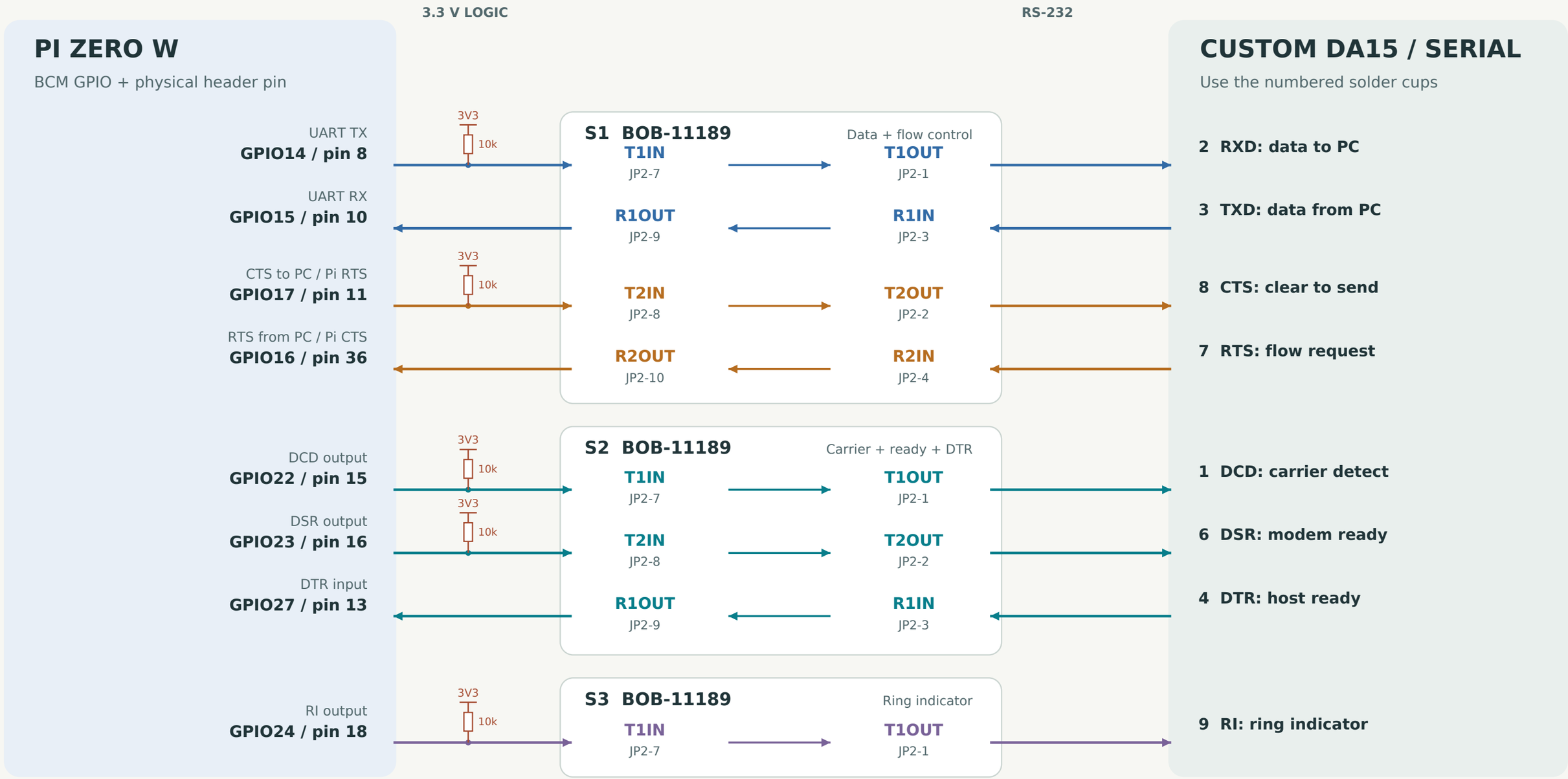
Waveshare MCP23017 board

Wiring the three SparkFun boards

Original Raspberry Pi Zero W to one Female custom DA15. Board terminal identities verified from SparkFun v1.1 schematic + PCB.

PROPOSED GPIO / FIRMWARE ALLOCATION

The connections below are a wiring plan, not a tested build. Complete the checks on page 6 before applying power.



S1 / S2 / S3 are labels you put on the boards. No signal wires run directly between the three boards.

Power and common ground - all three boards

Pi 3V3 / physical pin 1 → **S1, S2, S3: JP2-5 / 3V-5.5V** — Use 3.3 V here, never 5 V.

Pi GND / physical pin 6 → **S1, S2, S3: JP2-6 / GND** — **Also connect DA15 solder cup 5.**

The 3.3 V wire feeds the converter boards; it is not the Pi power input. DA15 pin 9 is RI, not power.

PC serial branch: custom DA15 pins 1-9 to same numbered DE9 pins; then straight-through serial cable, not null modem. RS-232 signals never connect directly to Pi GPIO. All arrows show signal travel, not connector orientation.

Five 10 kOhm pull-ups are shown above, one per used T input. They bias idle during high-impedance boot states; they do not guarantee safe startup.

Identify the pins before wiring

JP2 numbers are SparkFun header pad numbers, not IC pin numbers. Pi pin numbers are physical positions on its 40-pin header.

SparkFun BOB-11189 header

UNDERSIDE / LABEL SIDE UP, pad row at the bottom

Signal labels are underneath. The component-side view is mirrored.

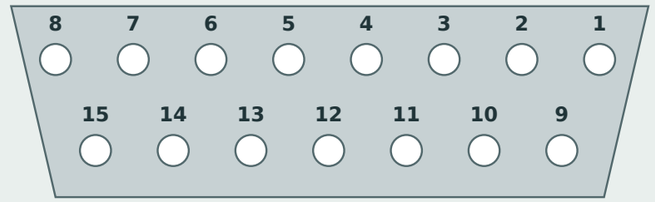
T1OUT	T2OUT	R1IN	R2IN	3V-5.5V	GND	T1IN	T2IN	R1OUT	R2OUT
1	2	3	4	5	6	7	8	9	10

RS-232 side **LOGIC side**

Use the printed labels as the primary check; do not rely on counting pads alone.

Female custom DA15

Looking INTO the socket / mating face



SOLDER SIDE: top 1-8 left to right; bottom 9-15 left to right.
Verify molded numbers; insulate every cup.

Pins reserved for display + audio

OLED + MCP23017 SDA	**GPIO2**	**pin 3**
OLED + MCP23017 SCL	**GPIO3**	**pin 5**
Amplifier BCLK	**GPIO18**	**pin 12**
Amplifier LRCLK / LRC	**GPIO19**	**pin 35**
Amplifier DIN	**GPIO21**	**pin 40**

LEDs stay on the MCP23017 with individual resistors. No extra Pi GPIO is assigned for LEDs here. GPIO20 / pin 38 is also left free for PCM input.

Unused SparkFun channels

S1: all signal channels are used.

S2: leave R2IN (4) and R2OUT (10) unconnected.

S3: tie unused T2IN (8) to 3.3 V / JP2-5.

S3: leave T2OUT (2), R1IN (3), R2IN (4), R1OUT (9), R2OUT (10) unconnected.

Never tie outputs together. Input handling must match the actual fitted transceiver datasheet; this plan assumes the documented MAX3232/SP3232 family behavior.

Before applying power

1. Verify three BOB-11189 v1.1 boards. On the bare female solder-cup DA15, check each cup against its numbered mating contact. Front and solder views are mirrored; shell is not pin 5. This is DA15 (8+7), not VGA/HD15 (5+5+5).
2. With every supply disconnected, check shorts, soldering and 3.3 V / GND connections. Insulate every DA15 cup and strain-relieve the harness. Shell is not signal return; USB shield termination remains part of the pending cable review.
3. Verify firmware against this allocation. Zero W defaults to mini UART; prefer PL011 by disabling/reassigning Bluetooth. Explicitly configure GPIO16/17 pin functions and flow control; disable the Linux serial console. Pi RTS/CTS labels do not imply enabled hardware flow control.
4. Add the five separate 10 kOhm pull-ups shown on page 5. Initialize the CTS/DCD/DSR/RI Pi GPIOs HIGH (deasserted); LOW asserts RS-232 controls. Pull-ups cannot override driven LOW pins or guarantee brownout/startup behavior.
5. Keep the PC cable disconnected for initial bring-up. OLED/MCP use 3.3 V; the amplifier uses barrel 5 V and common ground. Neither speaker terminal is ground. Do not connect the USB branch until page 7 review is complete.

Status: board pin identities checked; no GPIO conflicts with the listed peripherals; no USB gadget integration, power, load, thermal or physical wiring test has been performed for W6A.

Sources (click to open)

SparkFun official schematic + PCB
SparkFun BOB-11189 product / datasheet
Raspberry Pi hardware / UART
Original Zero W schematic / 40-pin header
Zero W power-pad reference
Waveshare MCP23017 pin definitions
MAX98357A manufacturer datasheet
Transceiver data and unused-input requirements

DA15: serial plus USB OTG data

New proposed custom pinout, not an existing standard. PC = USB host; original Pi Zero W = USB peripheral / gadget.

NOT READY FOR POWERED CONNECTION: VBUS / HOST-PRESENCE DESIGN IS UNRESOLVED

The two new contacts carry D- and D+ only. Common GND is also mandatory. No USB power is routed through this connector.

PC USB host / custom cable

USB-A pin 2: D- -> DA15 pin 10
USB-A pin 3: D+ -> DA15 pin 11
USB-A pin 4: GND -> DA15 pin 5
USB-A pin 1: VBUS NOT CONNECTED
Insulate VBUS at the breakout.
Do not trust cable colors alone.

CUSTOM DA15 harness

10: USB D- (new)
11: USB D+ (new)
5: shared signal / USB GND
12-15: no connection
1-9 retain W5 serial functions.
No +5 V on any DA15 contact.

Pi Zero W USB data pads

DA15 10 -> PP23 / USB D-
DA15 11 -> PP22 / USB D+
DA15 5 -> common GND / PP6
PP1 stays on switched barrel 5 V.
Micro-USB DATA: pin 2 D-, pin 3 D+
ID (pin 4) stays open for device role.

Serial breakout: preserve every W5 function

DA15 -> PC DE9: 1 DCD, 2 RXD, 3 TXD, 4 DTR, 5 GND, 6 DSR, 7 RTS, 8 CTS, 9 RI (same numbered contacts).

The eight serial signals still go through the three SparkFun level shifters, exactly as page 5. USB bypasses them entirely.

DA15 5 also joins USB GND. Do not connect to a gameport, AUI, VGA adapter or any generic D-sub cable. RS-232 can damage USB.

Power / role decision before build

Barrel-only power avoids joining two 5 V supplies, but cutting VBUS does not establish a compliant self-powered USB interface. Host VBUS presence and safe USB attach/detach must be handled. This drawing contains no verified VBUS-sense, power-mux or data-disconnect circuit.

Resolve that circuit and exact board behavior before plugging into a PC. Do not fix enumeration by joining host 5 V to PP1. A Pi-as-host design is different and requires a protected downstream VBUS source; this sheet does not implement it.

Software and cable are not yet qualified

Gadget-capable kernel/controller setup and a USB modem function are still required. A USB serial gadget alone does not expose the existing UART Hayes modem. Bind its application, DTR/carrier behavior and exclusive transport selection; prevent competing UART/USB sessions.

Use a short USB-quality twisted D+/D- pair, minimal untwisted stubs, insulation and strain relief. Ordinary D-sub cable is not USB-qualified. No speed, cable-length or Windows driver compatibility claim is made; test the target Windows version and descriptors.

UNPOWERED CHECKS: verify PP23 to USB data-port pin 2 and PP22 to pin 3 with a verified breakout; do not guess pad orientation. Verify pin 5 continuity, VBUS isolation, no data-to-RS-232 shorts and female front/solder mirroring (page 6). No connection to the PWR IN port for data.

AFTER DESIGN REVIEW: check backfeed in both power states, host-off/disconnected attach behavior, enumeration, reconnect/suspend, target Windows drivers, AT commands, DTR hangup, PPP and serial regression. Confirm cable signal integrity and immunity to audio/RS-232 activity. No physical tests have been run.

Pi official pad reference: PP22 D+ / PP23 D-

Zero W power / header schematic

Linux USB gadget power / VBUS API