Soldering Guide

For the soldering technician. This guide gives the rules and the order of work. Every joint (board, pin, wire, destination) is in **THARVIN_SOLDERING_SHEET.pdf**.

Do NOT solder onto battery cells. The battery packs arrive already spot-welded.

Tools

- Temperature-controlled iron (60 W): 330-350 C for signal pins, 380-400 C for thick power wires.
- Solder 0.6-0.8 mm rosin-core, no-clean flux, desoldering wick and pump.
- Wire stripper, flush cutter, heat-shrink, multimeter with continuity beep, helping hands, fine tweezers.

Order of work

1. **Header pins** on the modules that come without them (mics, OLED, sensors, camera if loose).
2. **Level-shifter board** (74AHCT125 on perfboard) - layout drawing in the soldering sheet.
3. **Power-button (soft latch) board** (25 x 30 mm) - small 1206 parts, do it slowly; 2N7002 on SOT-23 adapter boards; timer capacitor C4 is the larger 1812 part. Keep everything under 4.4 mm tall. Layout in the soldering sheet.
4. **Power wiring**: BMS leads, XT60 / XT30 connectors, inline PTC fuses, fuse holder, buck converter inputs and outputs. Use the wire gauges in the sheet.
5. **Small boards**: PAM8403 amplifier + speaker, MP1584 (5 V), XL4005 (6 V), NTC on the heat block.
6. **Sense board** (NTC divider + battery divider) shares the level-shifter perfboard - see the sheet.
7. **Neck loom**: 22 wires of 28 AWG silicone (5 V and GND doubled), with a ~70 mm service loop inside the head. Route exactly as neck_route.png - a flat ribbon does NOT fit.
8. **Charger**: OUT+ to BMS P+, OUT- to BMS P- (22 AWG), on the battery side of the XT60, so it charges with the robot unplugged.
9. **Servo leads** are plug-in - do not solder servos.
10. Insulate every joint with heat-shrink.

Before connecting any power

1. Set each buck converter with NO load first: 300 W buck 6.8 V, XL4005 6.0 V, MP1584 5.0 V (and current limits as in the sheet).
2. Continuity check every joint in the sheet; check there is NO short between + and - on every rail.
3. Check polarity of every connector (red = +).
4. First power-up with only the logic connected (no servos), measure 5.0 V and 3.3 V.
5. Only then connect the servo rails.

Good joint / bad joint

Good	Bad - redo
Shiny, smooth cone, wire outline visible	Dull, grainy, ball-shaped blob
Solder flows onto pad and pin	Gap between solder and pad (cold joint)
No bridge to the next pin	Solder bridge between pins

Questions about a joint: stop and ask the owner. Never guess a wire.