

Using Multiple Power Supplies with Acorn

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Overview

ACORN PCBs revision 171025 and older may fail to start properly if external voltage is applied to certain pins **before the ACORN +24VDC supply starts.**

If a system meets the following conditions:

1. More than one power supply or voltage is used in the system
 - (a) Multiple output power supplies are unlikely to cause a problem because all voltage outputs normally turn on at the same time
 - (b) Motor drives and other accessories may have an internal supply that is not immediately obvious
2. No blue LEDs light on the BeagleBone attached to ACORN after applying +24VDC power to H9
3. One or more of the following outputs are used
 - (a) Any open collector output (ST1, DR1, EN1, ST2, DR2, EN2, ST3, DR3, EN3, ST4, DR4, EN4, OC3, OC4, OC5, OC6, OC7, OC8)
 - (b) Any output on the DB25 connector
 - i. The DB25 outputs are intended for connection to logic level devices. These do not normally source voltage. If a device's inputs do source voltage, connect to the open collector (screw terminal) outputs instead.
4. External voltage is applied to any encoder connector pin
 - (a) Do not do this.

Then this document provides some solutions.

Solutions

Any one of the following solutions may be used to correct the voltage feedback problem.

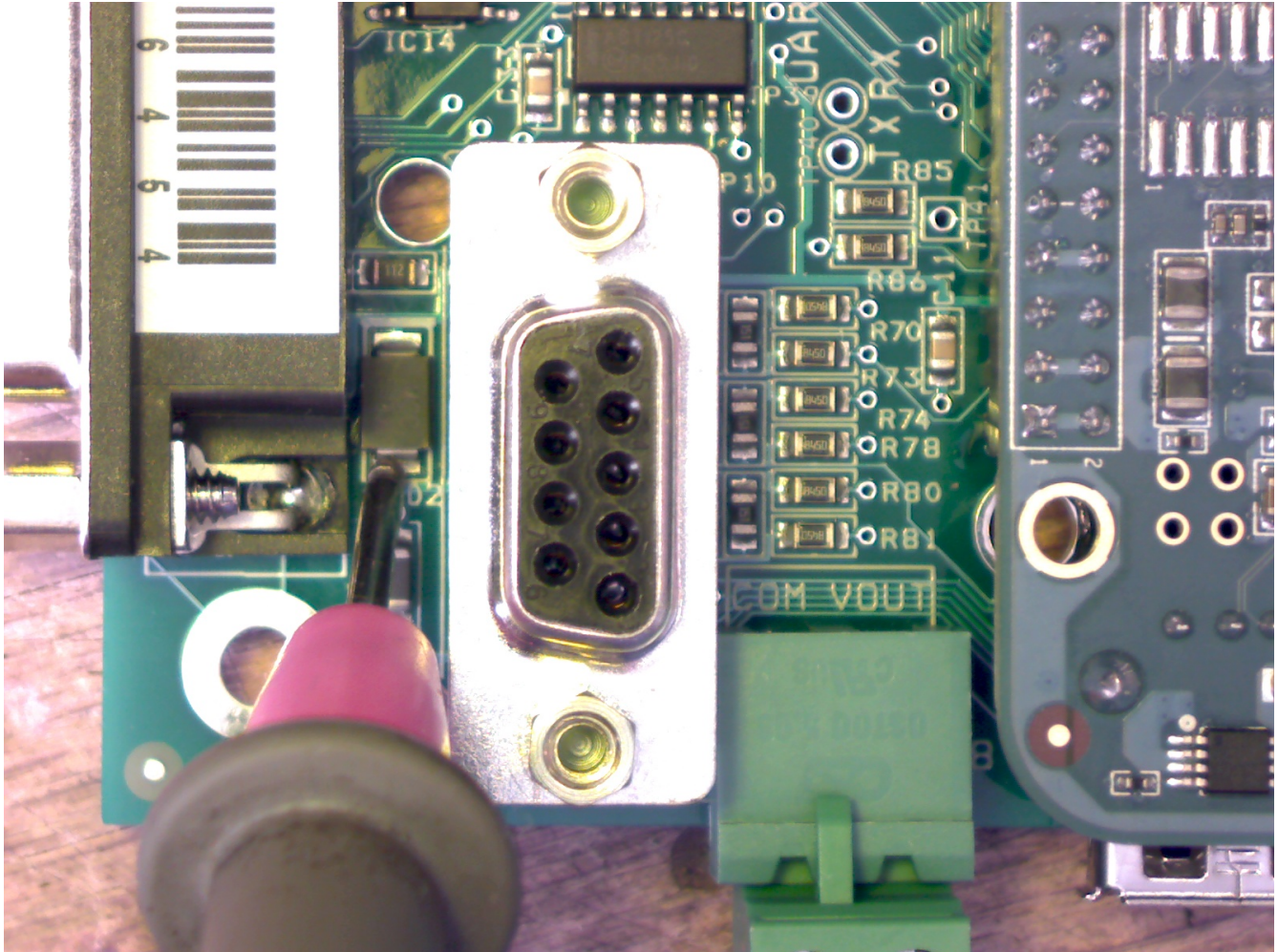
1. Wire the system to use 24VDC and only use one 24VDC power supply.
2. Use a multiple output voltage power supply that powers all voltage rails at the same time.
3. Sequence power supply start up so that the ACORN 24VDC supply starts first.
4. Wire outputs so that external pull ups to different supplies are not needed.
5. Modify the ACORN so that open collector outputs will not allow feedback (following sections).

Problem Quick Check

Perform the following test to check for voltage feedback problems.

1. Disconnect ACORN H9 power header or remove the +24VDC wires
2. Turn on the system
3. Measure between D2 pin 2 and H9 COM terminals
4. If the reading is not 0V, there is external voltage getting into ACORN that may cause startup problems.

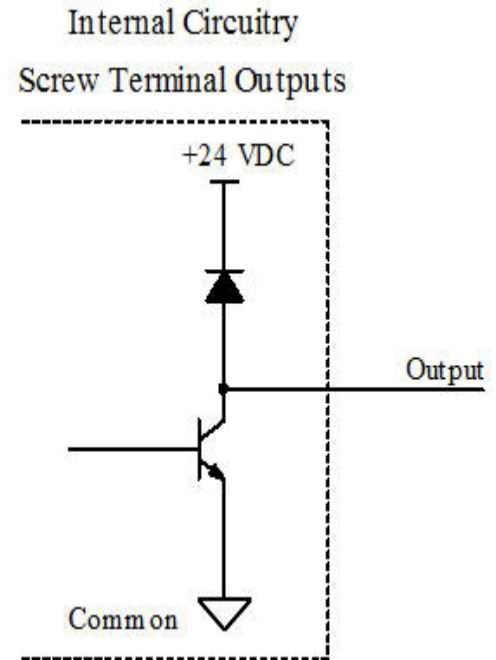
D2 Voltage Reading



Problem Cause

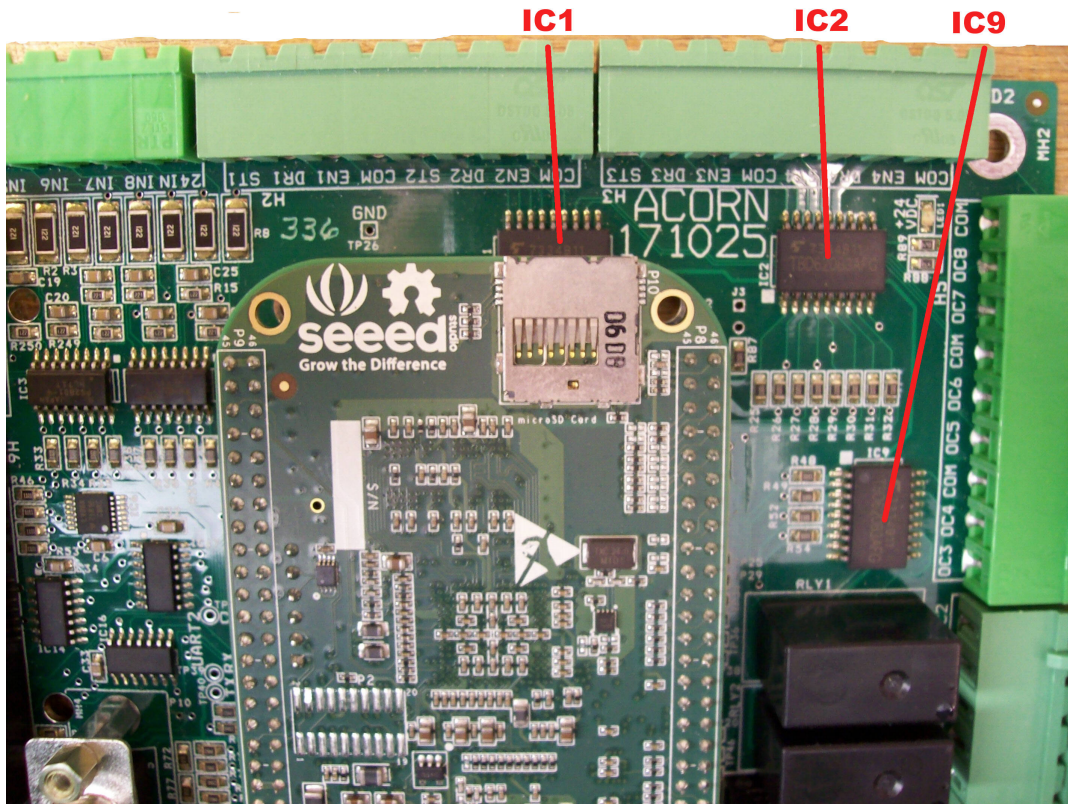
Acorn open collector outputs have a diode that connects to +24VDC. Normally, this diode serves as a snubber in case a relay is connected that is not properly snubbed. If voltage is fed into the output that is greater than +24V, or the +24 supply is off, this diode can cause problems. Voltage may flow through the diode and partially power ACORN logic.

The next section shows how to remove the diode connection to +24VDC. If a relay or other inductive load is controlled by an output, it is important that a snubber diode is installed near the coil to reduce noise spikes. As long as external wiring is done correctly, there is no disadvantage to disconnecting ACORN's diodes.

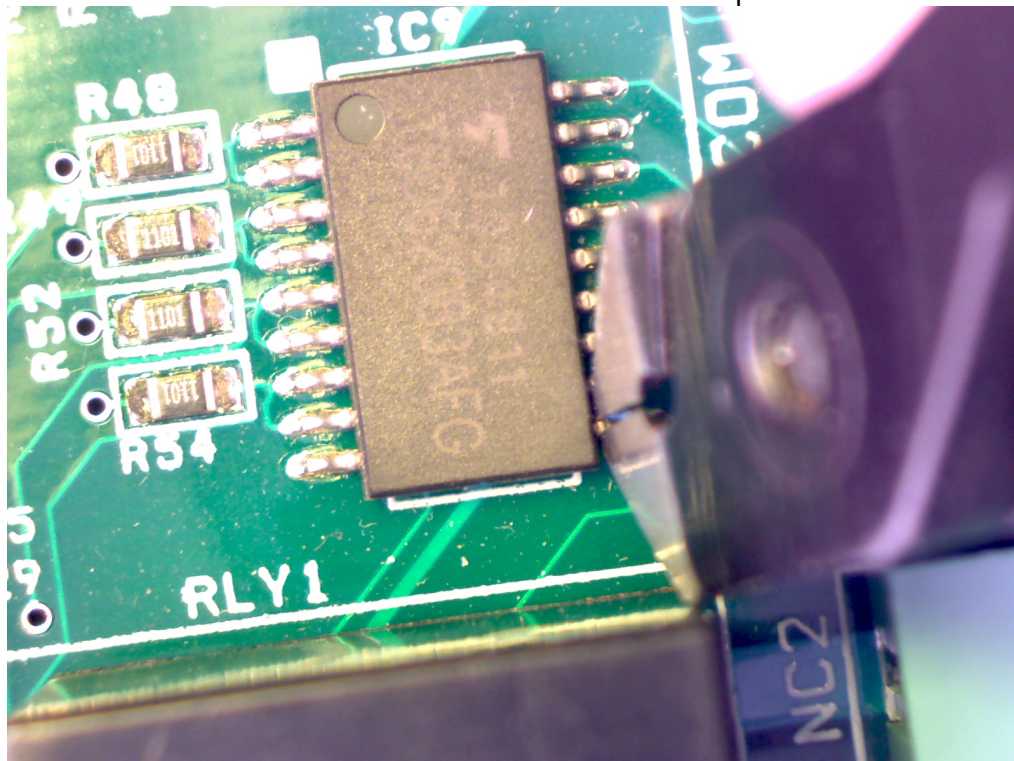


Solution #5 Instructions: ACORN Modification

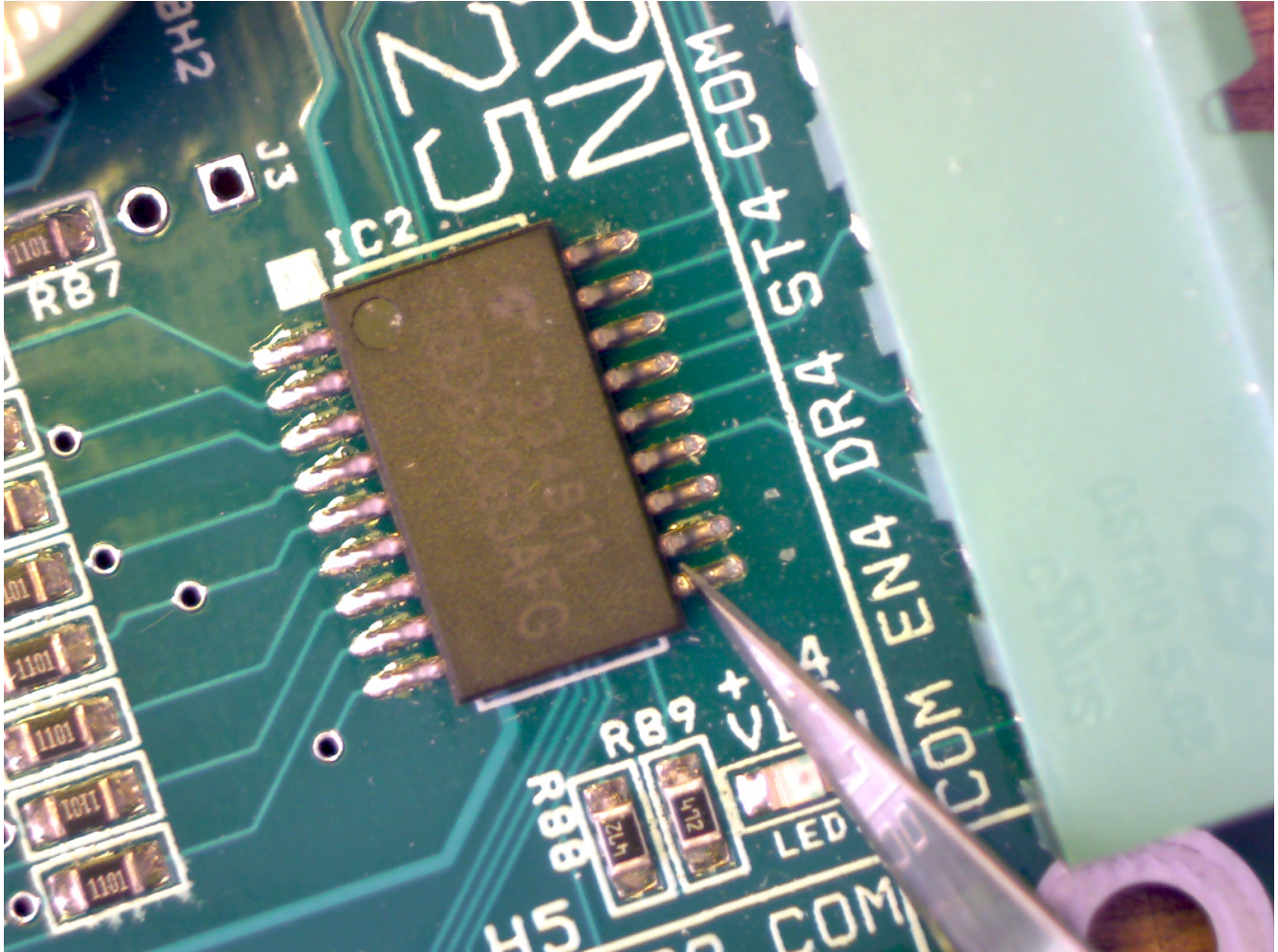
Pin 10 of the output drivers will be disconnected. The output drivers are IC1, IC2, and IC9.



Pin 10 is on the corner farthest from the molded circle that indicates pin 1.



Very fine point cutters are needed to cut pin 10 without damaging other pins or the PCB. Another alternative is to cut the pin with a sharp knife (X-Acto #11 or similar works well). Place the blade near the IC body and press straight down until the pin is cut free.



Remember to repeat the cut for all three ICs. The severed pin may be desoldered or left in place as long as the electrical connection is broken.