

TAA-1 Engineering Package

Temporary Electromagnetic / Electric-Strike Access Control for Shared Appliances and Community Equipment

This package expands the earlier concept into a build-ready starter set: conceptual wiring, bill of materials, product brief, and production-oriented firmware skeleton. It is designed for pilots such as shared laundry, fridge lockers, tool rooms, charging cubbies, and other temporary-access community assets.

1. System Intent

TAA-1 is a **fair-access control layer**. Instead of treating shared appliances and storage as permanently open or manually policed, it grants temporary access windows and can optionally enable power only for the active session. The design goal is simple: verify permission, not identity-heavy surveillance.

2. Recommended Physical Architecture

For most appliance and cabinet builds, the practical lock choice is an **electric strike** or **solenoid bolt**, not a bare door maglock. That produces better hold strength on flexible consumer doors and simplifies retrofit mounting.

Recommended stack:

- 12V regulated power input
- Fuse + transient suppression + reverse-polarity protection
- Buck converter for the 5V logic rail
- ESP32 controller for timing, policy, and optional wireless features
- MOSFET-driven lock output with flyback protection
- Relay or contactor for appliance power enable
- Door sensor, tamper switch, indicators, and manual override

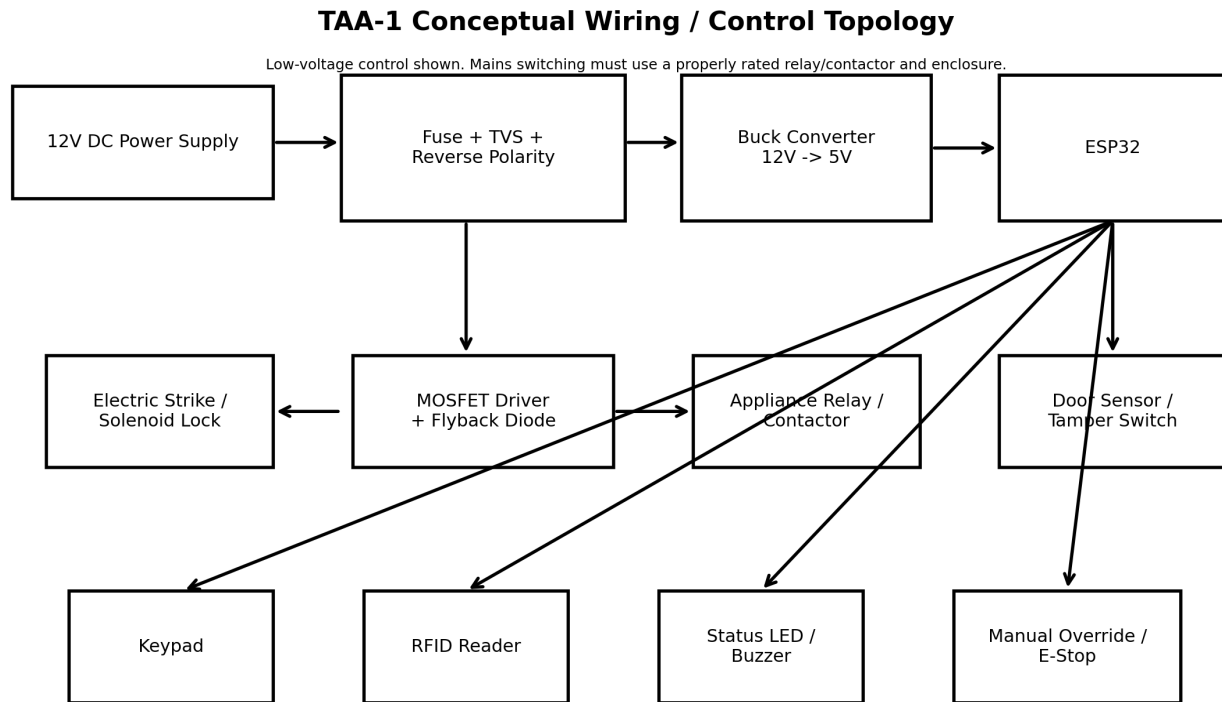


Figure 1. Conceptual low-voltage topology. Appliance mains switching must use a properly rated relay/contacter, enclosure, and local electrical code compliance.

3. Safety Profile

Every installation must explicitly declare whether it is **fail-safe** or **fail-secure**. For shared storage and appliance gating, fail-secure hardware is usually the better fit. For life-safety egress, fail-safe rules dominate. TAA-1 is not a substitute for certified fire-door hardware or code-compliant access control.

Minimum safeguards:

- Manual override accessible to authorized staff
- Documented recovery path after fault or power loss
- Isolation between low-voltage logic and mains switching
- Coil suppression on inductive loads
- Tamper detection for enclosure opening

4. Build Tiers

Tier	Best use	Locking	Credential	Power control	Notes
A	Single cabinet / pilot	12V bolt or strike	Keypad	Optional	Fastest MVP
B	Appliance node	Strike / bolt	Keypad + RFID	Yes	Best for laundry / charger / cubby

C	Room controller	Multiple nodes	Tokens / rotation	Yes	Property or institutional deployment
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5. Firmware Scope

The included firmware file is a production-oriented skeleton. It implements state-based control rather than one-off delays, which makes it easier to harden. States include **LOCKED**, **UNLOCK_WINDOW**, **SESSION_ACTIVE**, and **FAULT**.

It still needs site-specific integration for keypad scan, RFID validation, rotating-token logic, and any reservation engine. In other words: the structure is ready, but the credential plumbing is intentionally left open.

6. Product Direction

This concept can be commercialized in three directions:

- **Builder kit:** low-cost open hardware for DIY and community hackerspaces.
- **Property manager kit:** appliance and cubby nodes for apartments, co-ops, and HOAs.
- **Institutional controller:** multi-node systems for schools, churches, shelters, and shared workshops.

7. Limitations

This package includes a **conceptual wiring diagram**, not a stamped electrical drawing. It is suitable for prototyping and architecture planning. Final installation details must be validated for the target appliance, load, enclosure, and electrical code environment.

Included files in the ZIP:

- TAA1_Engineering_Package.pdf
- TAA1_Wiring_Diagram.png
- TAA1_Parts_List.csv
- taa1_production_firmware.ino
- TAA1_Product_Design_Brief.txt