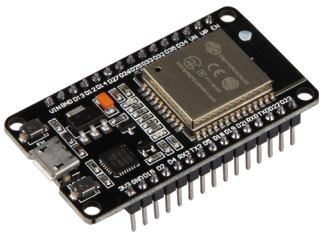


Lexzach 1

Antigneous TECHNICAL Instruction Manual

EEPROM Version: 1.4

IMPORTANT:
Make sure you are up to date. Check the firmware version on your panel. [menu>settings>panel>about]

Should I be reading this?

This is the **technical** instruction manual for the operation of the Antigneous fire alarm control panel (FACP). This manual will go very in-depth. If you just want the regular instructions, please read the non-technical instruction manual.

Disclaimer!

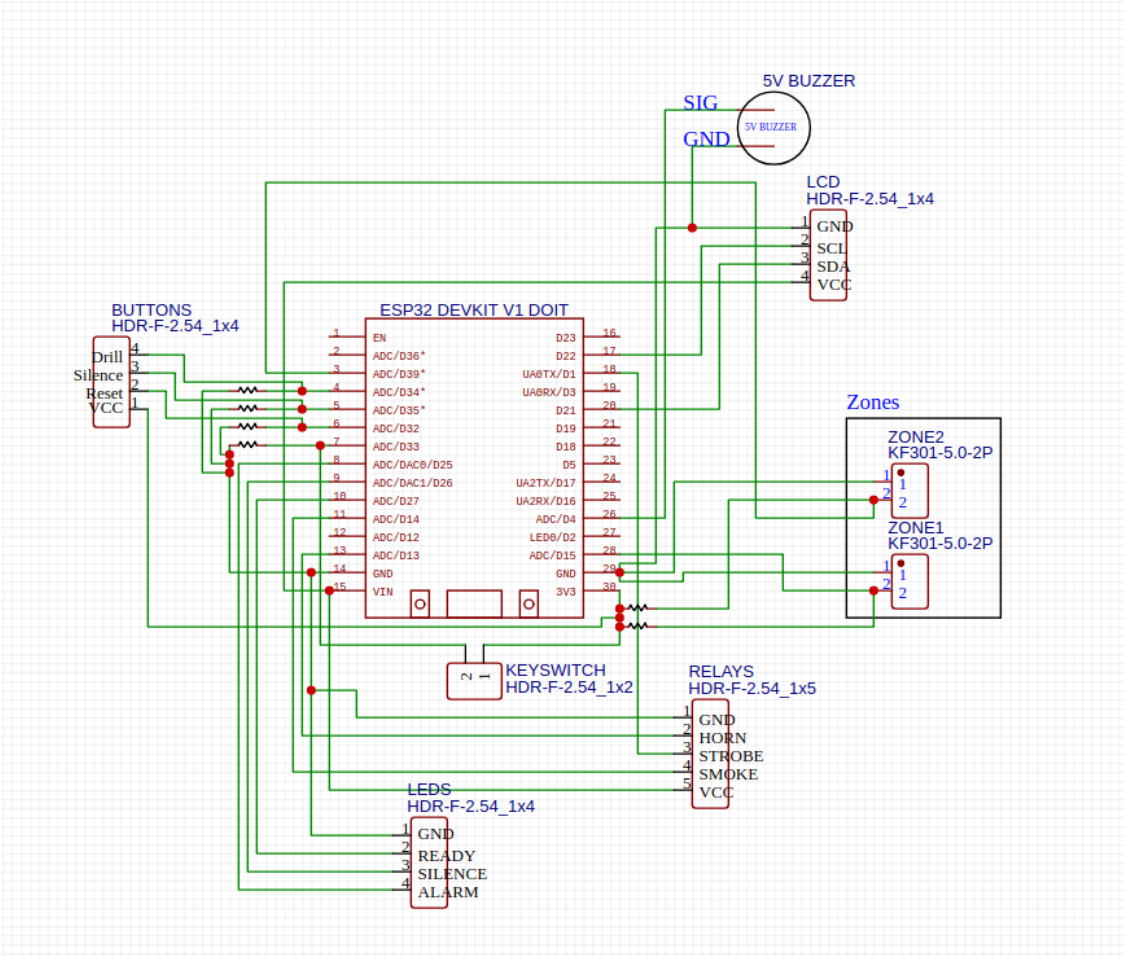
Antigneous is **not** officially approved for use as a fire alarm system. Although the creator has done everything they can to make sure the panel will work with zero issues, this cannot be guaranteed without extensive testing by official parties. If you do not accept the inherent risk of using a non-approved fire alarm system. DO NOT USE THIS.

Table of Contents

The Brains of Antigneous

Antigneous runs off of an ESP-32 Dev Kit V1. This board offers many features that are not present on other boards. This board even includes built in WiFi, which may be used in the future. Since Antigneous is programmed onto an ESP32, it is programmed in Arduino C++.

Antigneous Pinout	
Zone 1	15
Zone 2	39
Horn Relay	13
Strobe Relay	18
Smoke Relay	14
Panel Buzzer	4
Ready LED	27
Silence LED	26
Alarm LED	25
Key Switch	33
Reset Button	32
Silence Button	35
Drill Button	34
SCL (LCD)	22
SDA (LCD)	21



External Libraries:

LiquidCrystal_IC2 by johnrickman

EOL Resistors

Antigneous is able to detect ground faults through the use of end-of-line (EOL) resistors. EOL resistors are placed at the end of an activating device chain (i.e. pull station → pull station → smoke detector → pull station, or really any combination of activating devices) and allows for the detection of a line break within the system. This guarantees that the panel will detect if a device is no longer electrically able to close the activation circuit. This allows the panel to detect a broken wire or disconnected device and

throw a trouble code. By extension, this means that the panel will always be able to read the device state, assuming no trouble codes are being ignored.

The panel does the following routine for checking for ground faults:

1. When the zone 1 pin or zone 2 pin registers as a 4095, the panel increments a variable to keep track of subsequent readings of 4095.

2. If something other than 4095 is read, the panel resets this variable to 0.

3. If this variable reaches 1000 (1 per 1 ms) or above, the panel displays a trouble code, turns on a buzzer, and pulses the ready LED, which the user can silence by pressing the silence button, assuming the panel is not in alarm.

EEPROM

Antigneous makes use of the ESP-32 Dev Kit V1's EEPROM to store user settings.

Antigneous EEPROM Addresses and Values			
Memory Address	**Data Contained**	**Default Value**	**Possible Values**
1-6	The string "Lexzach" to verify that this EEPROM was written by any version Antigneous FACP.	76, 101, 120, 122, 97, 99, 104	NA
7	Coding for NACs	0 (Code 3)	0 (Code 3) 1 (Marchtime) 2 (Code 4-4) 3 (Continuous) 4 (California Code) 5 (Slow Marchtime)
8	Key switch requirement	0 (No key required)	0 (No key required) 1 (Key required)
9	Verification	1 (Verification enabled)	0 (Verification disabled) 1 (Verification enabled)
10	Verification time	25 (2.5 seconds)	1-255 (n*10 = Verification time in MS)
11-26	Panel name	65, 78, 84, 73, 71, 78, 69, 79, 85, 83, 32, 32, 32, 32, 32, 32 (ANTIGNEOUS followed by 6 blank characters)	0,32,45,46,47,48,49,50,51,52,53,54,55,56,57,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90 for each address

27	Keyless Silence	0 (Key is required for silence, assuming keyswitch security is enabled)	0 (Keyless silence disabled) 1 (Keyless silence enabled)
28	Post-restart smoke detector verification time	24 (Smoke detector verification time is 2 minutes)	0-255 (n*5 = detector timeout in seconds)
29	Strobe sync protocol	0 (No strobe sync)	0 (No strobe sync) 1 (System Sensor) 2 (Wheelock) 3 (Gentex) 4 (Simplex)
30	2 Wire	0 (Don’t use 2 wire)	0 (Don’t use 2 wire) 1 (Use 2 wire)
50	EEPROM version	NA	0-255
51	EEPROM build	NA	0-255
72 DEPRECATED	EOL resistor lenience	125 (500)	0-255 (n*4 = usable resistor lenience)
73	EOL resistor enabled	1 (EOLR enabled)	0 (EOL resistor disabled) 1 (EOL resistor enabled)
74	Pre-alarm	0 (Pre-alarm disabled)	0 (Pre-alarm disabled) 1 (Pre-alarm enabled)
75	Pre-alarm first-stage time	5 (5 minute first-stage)	1-255 (Minutes for first-stage)
76	Smoke detector verification	0 (Smoke detector verification disabled)	0 (Smoke detector verification disabled) 1 (Smoke detector verification enabled)
77	Smoke detector timeout	12 (Smoke detector timeout is 1 minute)	0-255 (n*5 = smoke detector timeout in seconds)
78	Homescreen	0 (Panel name)	0 (not currently used)
79	Audible silence	1 (Audible silence enabled)	0 (Audible silence disabled) 1 (Audible silence enabled)
80	LCD timeout	0 (LCD timeout disabled)	0-255 (n*15000 = LCD timeout in MS)

EEPROM Integrity Verification

On boot, Antigneous verifies the integrity of the EEPROM by checking the values of several memory addresses for invalid values. If any of the values are not as expected, Antigneous will display ERROR 1, unless the firmware version and build are different, in which case the panel will display ERROR 2.

and will prompt the user to check the manual. If the user presses the reset button, the panel will reset, if the user has not fixed the issue before pressing the reset button, the panel will most likely fail the validity check again. If the user presses the drill button, the panel will reset the EEPROM to factory defaults and perform a warm restart.

Antigneous EEPROM validity check routine	
Memory Address	Expected Value
0	76
6	104
7	0, 1, 2, 3, 4, 5
8	0, 1
50	Current EEPROM version
51	Current EEPROM build

EEPROM Factory Reset Methods

In the case that the panel is inoperable, or the user wants to reset the panel to factory settings, Antigneous has multiple methods of resetting the EEPROM to a factory state.

Methods of resetting the Antigneous EEPROM
Holding down the **silence**, **reset**, and **drill** buttons during startup. This will prompt the user to continue holding down the buttons if they intend to perform a factory reset. The panel will wait 5 seconds after prompting the user, and if the user continues to hold down the buttons through the 5 seconds, the EEPROM will be reset. To prevent a state where the panel cannot be reset, either through a fault that prevents the panel from booting, or the key lock being toggled on without a key switch, resulting in a panel that would otherwise need to be re-flashed; Antigneous will not take the key switch into consideration when using this method to restore the EEPROM. The code for resetting the EEPROM via the buttons on startup is one of the first chunks of code executed on startup. Everything before it is code to setup pins and startup the serial monitor. This means that the three button EEPROM reset should be able to reset a panel no matter what state it is in.
Navigating to **Settings > Panel > Factory Reset** within the menu allows the user to reset the EEPROM from a running panel. Once the user confirms they wish to reset the EEPROM, the panel performs a factory reset routine and then warm reboots.
If the panel fails to verify the integrity of the EEPROM, the panel will display ERROR 1. Once displayed, the user can press the **drill button** to reset the panel to factory settings and then warm reboot.

Activating Device Check Routine

Antigneous polls activating devices with a 1 millisecond delay. If the value returned from checking the zone 1 and zone 2 pins is a 0, the panel knows that there is a short in the activating device loop, and thus an activated device. The routine the panel performs is listed below, although, the panel will skip this routine if verification is turned off.

Note: The ESP32 Dev Kit V1 reads voltage across a pin as a value between 0 and 4095. But this **does not** correlate with voltage.

Antigneous Zone Values	
Reading Across Zone 1 or Zone 2	**Meaning**
0	Activated Device
4095	Ground fault / missing EOL
1-4094	Normal

The panel does the following routine for verification:

1. When a 0 is read on the zone 1 pin or zone 2 pin, the panel waits for the amount of time set by the user for verification.

2. When the panel is done waiting, it checks the zone 1 pin and zone 2 pin again.

3. If zone 1 or zone 2 is still 0, the panel activates the NACs.

Note: If the user has verification turned off, the panel will activate the NACs after it reads a 0 on the zone 1 pin or zone 2 pin.

LCD Display

The LCD display is the main interface for interacting with the panel. From changing settings to displaying error codes, the LCD is truly an important part of the panel. Although, if you *really* had no other option, the panel *can* operate with limited functionality without the LCD display.

LCD Display Menu Pages		
Internal Page ID	**Page Directory**	**Page Contents**
0	Main	Testing

		Settings
1	Main > Testing	Walk Test Silent Wlk Test (Silent Walk Test) Strobe Test
2	Main > Settings	Fire Alarm Panel
3	Main > Settings > Fire Alarm	Coding Verification Pre-Alarm Audible Sil.: (Audible Silence) No-Key Sil.: (Keyless Silence) Strobe Sync 2 Wire:
4	Main > Settings > Fire Alarm > Verification	Verification: V.Time: (Verification Time) Det.Verif.: (Detector verification) Det.Timeout: (Detector timeout) Det.Watch: (Detector watch time)
5	Main > Settings > Fire Alarm > Coding	Temporal Three Marchtime 4-4 Continuous California Slow Marchtime
6	Main > Settings > Fire Alarm > Pre-Alarm	Gen.Pre-Alarm: (General pre-alarm) Stage1 Time:
7	[REMOVED]	[REMOVED]
8	Main > Settings > Panel	Panel Name Panel Security LCD Dim: Factory Reset About
9	Main > Settings > Panel > Panel Security	None Keyswitch
10	Main > Settings > Panel > Panel Name	Enter Name: [name]
11	Main > Settings > Fire Alarm > Strobe Sync	None System Sensor Wheelock
12	Main > Settings > Panel > About	Antigneous FACP Firmware: [firmware version]

		by Lexzach

LCD Display Status Messages		
Internal Screen ID	**Screen Meaning**	**Screen Contents**
0	System is normal, no troubles or alarms are happening.	System Normal [panel name]
1	System is in trouble.	* Trouble * [trouble reason]
2	[unused]	[unused]
3	System is in alarm.	* FIRE ALARM * [zone]
3	System is in pre-alarm.	* PRE ALARM * [zone]
4	System is silenced.	-- SILENCED -- [zone]
5	System is in supervisory.	* Supervisory * [supervisory reason]
6	System is about to start a drill. Shows when user is holding down the drill button	CONTINUE HOLDING TO START DRILL

Smoke Detector Verification

Antigneous has the ability to do smoke detector verification. This allows the panel to prevent smoke detectors that knowingly provide false-alarms from triggering an evacuation event. Antigneous is able to tell the difference between a smoke detector and a pull station by cutting the power to the smoke detector relay, then checking the activating device loop, if the closed circuit has returned to open, it is flagged as a smoke detector, if the circuit continues to be closed, it is flagged as a pull station, and verification is not used.

Limitation of Smoke Detector Verification

Currently, Antigneous cuts power to the smoke detector relay for 100 ms before checking the zone 1 and zone 2 pin. If a smoke detector requires more than 100 ms to open the circuit, the panel will believe that it is a pull station, and thus skip smoke detector verification entirely.

If a pull station were to be reset less than 100ms after verification completed, it would be counted as a smoke detector, and would begin a smoke detector verification sequence. If a smoke alarm is then

triggered during this fake smoke detector verification period, it would skip actual smoke detector verification, and would immediately cause an alarm.

Fail-safe Boot

Antigneous is designed for reliability over everything else, if Antigneous fails to boot, either from an EEPROM error or any other failure, the panel will boot into a limited functionality mode. Fail-safe mode can also be triggered by the user by holding down the reset button during boot. Fail-safe mode ensures that the panel will always be able to alert people in the case of a fire, even if a large amount of the panel code is destroyed or the EEPROM is wiped. Since fail-safe mode boots before the EEPROM is checked, it will avoid an issue where an illegal EEPROM value is stored, which would cause a core dump and a boot loop of the panel.

Fail-safe behavior:

- Reset button will instantly power cycle the panel
- Drill button is disabled
- Silence button disables the horn relay but keeps the strobe relay on
- Panel has no verification
- Panel coding is set to continuous
- No settings or testing