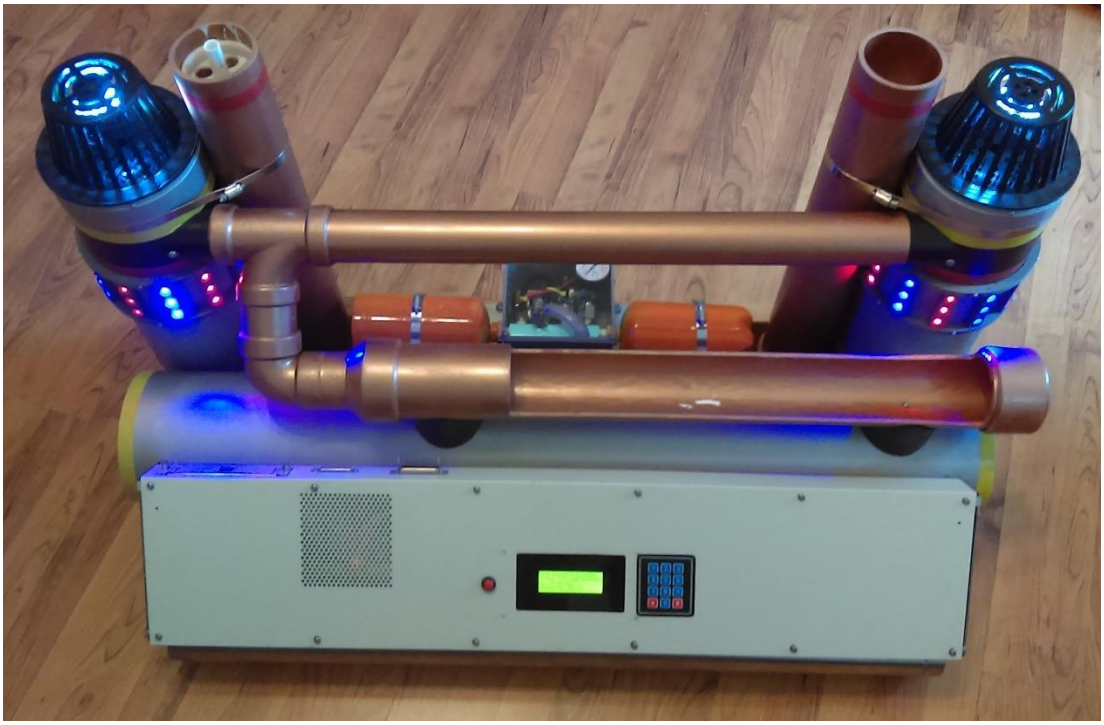
OPERATING MANUAL: BOOMBOX

DEVICE OVERVIEW

The following manual is intended for qualified personnel only. Operation and deployment of the BoomBox devices requires familiarity with the operating modes and options for maximum impact. Your effort in reviewing and practicing with the device, as well as anticipating how adept the players are at following the instructions, will be rewarded with smooth gameplay and maximum player involvement.

What follows is the operation and maintenance guide for this particular model: The BOOMBOX model.



CONTENTS

NORMAL OPERATION PROCEDURES

MODES OF OPERATION

The unit supports four modes of operation:

1. Simple Countdown Timer to Detonation
2. PIN code Lockdown to Detonation
3. Repeating Countdown to Detonation
4. Nuclear Fuel Charge and Countdown

Mode 4 assumes that a compatible Fuel Rod device is available. Modes can be altered or the device reset using the Initial Configuration process detailed below.

NOTE THAT IF A SYSTEM RESET IS NOT PERFORMED ON POWER-UP, THE LAST OPERATING MODE IS RE-STARTED.

STRONG RF EMISSIONS NEAR THE DEVICE HAVE BEEN PROVEN TO CAUSE UNDESIRED OPERATION, INCLUDING HANGING THE CONTROLLER, ERRONEOUS KEYPAD ENTRY, ETC. IT IS RECCOMMENDED THAT RF TRANSMITTERS ARE NOT OPERATED WITHIN SEVERAL FEET OF THE DEVICE.

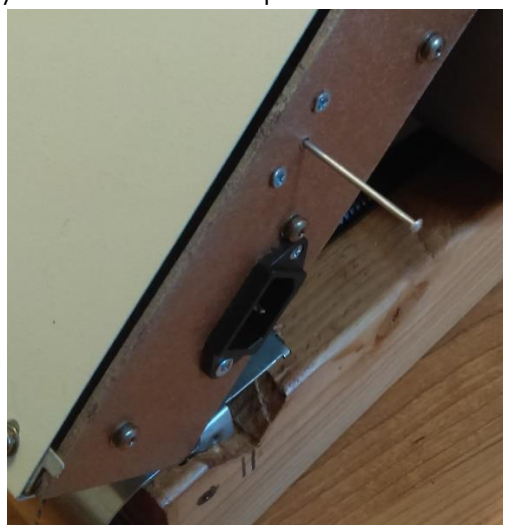
WARNING. IF THE BB CANNON IS ENABLED, THE SYSTEM WILL PLAY AN ALERT AT THE BEGINNING OF THE GAME. NO WARNING IS GIVEN BEFORE THE BB CANNON FIRES. THE COMPRESSOR WILL NOT RUN IF THE BB CANNON IS DISABLED HOWEVER, SO THAT IS THE BEST INDICATION DURING GAME PLAY THAT THE CANNON WILL FIRE UPON DETONATION. THE COMPRESSOR POWERS UP 30 SECONDS BEFORE DETONATION.

INITIAL CONFIGURATION/RECONFIGURATION

Initial configuration or altering the system settings is performed by accessing the programming menu. Since timing is critical, please read this section entirely before proceeding.

Follow these steps to initialize the device:

1. Obtain a thunder-B pin or other suitable small metal pin to use as the power key.
2. Note the position of the key access hole. Press a pin into the hole to turn the unit on and off.



3. Once powered up, the system start initialization. Lights and audio effects will begin. Once the LCD initializes, important information will be displayed, including warnings about battery life. If no other option is chosen the device will immediately start the last configured game mode.
4. Immediately press and hold the red button to reset the device.
5. The device will reset the memory and allow you to select the mode of operation.

Preparing the BB Cannon is a simple matter of filling it with BBs from the top of the tube. It doesn't matter if you fill the center or main fill holes around the center barrel, either will work. Not all BBs will be used in every shot, however the design is tolerant of some stray debris. Using 'used' bbs is permitted assuming they are not overly dirty. If the BB pressure setting needs to be adjusted the pressure switch can be adjusted by removing the cover and adjusting the screw (in means less pressure, 10-70PSI range). The duration of the pump power is controlled by the program and is not programmable.

PROGRAMMING MENU DETAILS

The following settings are available in Program Mode. Most of the features affect multiple game modes, but some have different effects depending on Game Mode. For example, EOD Mode allows guessing a PIN on PIN game, but in Fuel Charge mode it allows bypassing the detonation by simply holding a button. Details on modes and flow of the game is described in the game mode sections below.

1. Game Mode Selection:
    a. Countdown Timer to Detonation
    b. PIN code Lockdown to Detonation
    c. Repeating Countdown to Detonation
    d. Nuclear Fuel Charge and Countdown

2. Pre-Countdown Locate Beep: Prior to starting a countdown, the device can "beep" every 3 seconds to aid players in locating it. This mode allows you to hide the device on the field and help players find it easier.
3. Countdown Strobe: Enable or disable the strobe to flash every second during an active countdown.
4. Countdown Beep: Enable or disable the beeper to sound every second during an active countdown.
5. Countdown Time: Countdowns can run from 1 minute to 1000 minutes.
6. EOD Mode: Explosive Ordinance Disarming Expert Mode enable or disable. In PIN game, EOD means guessing a PIN will tell you high/low and never detonate from a bad PIN. In Nuclear Canister mode, the system can be disarmed by holding the red button for 2 minutes without interruption. Note that this mode is SEPARATE from the card/canister disable option.
7. Canister Sense: Allows using a suitable fuel rod to disarm the device instead of a card.
8. Card Sense: Enabling this mode allows a "hacking card" to immediately disable the device during countdown.
9. PIN: Enter a 1-9 digit PIN. If EOD mode is enabled, a 4 digit PIN should be used at the minimum.
10. Two Minute Warning: Enable this to hear the 2 minute klaxon sound and voice warning.
11. Two Minute Song: The MP3 song number to play as a two minute ambient music selection. MP3 song numbers can be found in the hidden MP3 Jukebox mode. (Ask)
12. Alert Duration: Number of seconds (1-240) that the alarm sounds when the device is detonated.
13. BB Cannon: Enable or Disable the BB Cannon when the device is detonated. Note that the compressor will also start ~30 seconds before end of countdown if BB Cannon is enabled.
14. MP3 Juke Box Mode: Set this to O to disable, or number of minutes between songs (5 or more suggested) if you want the device to randomly choose an MP3 song to play after being disabled or detonated.
15. Main Volume: Volume level (1-30) of most announcements. Warnings and effects may be louder than this level and cannot be adjusted. During MP3 play, the 7 and * keys allow volume up/down adjustments independent of the main volume setting.

FUEL ROD INTEGRATION NOTE

The Fuel Rod Prop suggested game play mode is any mode that uses the base to discharge the fuel rod. At the current time, that is:

- Mode 1 – Hot Potato
- Mode 5 – Search and Rescue

The fuel rods or canisters must have a strong magnet to trigger the sensor in the bottom left canister slot (over the left support). A small strong magnet is embedded in the bottom of the canister slot to trigger Fuel Rod sensors as well.

MODE 1 - SIMPLE COUNTDOWN TIMER TO DETONATION

Mode 1 allows the typical scenario – Once you start the countdown, it continues until the device detonates. You can pause the countdown by pressing the red button. You can also disable the device by using the card or fuel canister, if you have enabled those options.

Note that if you enable the card defeat or canister option, those devices must NOT be present or installed when the countdown starts (or it would immediately end). Of course, it is possible to put a dummy card or fuel rod in the device, which does not have the magnets installed, in order to allow normal operation.

EOD mode does not have any effect on this game mode.

GAME FLOW

The initial flow of this game, from system power on, is as follows:

1. System Powers up. Self-checks for battery level and other items are made, and warnings are played if the BB cannon is enabled.
2. Self-checks for cards or canisters are made if those options are enabled, and the system will wait until those are removed before proceeding.
3. The device will wait until a red button is pressed to begin the countdown. If the locator option is enabled, it will also beep once every 3 seconds to aid players in locating it. Once players start the countdown the locator will stop.
4. The device will count down to detonation:
    a. If the two minute warning option is enabled, a two minute alert klaxon sound and voice will be heard just before 2 minutes.
    b. If the two minute ambient music option is set to a song number other than 0, that song will be played. Recommendation is to play track 36, which ends exactly at 2 minutes.
    c. If the BB Cannon is enabled, at 30 seconds the compressor will start up and pump up the chambers.
5. Detonation can be disabled by inserting a bypass "hacking" card, or inserting a canister, assuming those options are enabled in programming (card sense, and can sense).
6. The countdown can be "paused" by pressing the red button. Pressing the red button again restarts from the same point in the countdown.
7. At detonation the device will sound for the set alert period and stop.
8. After detonation, the device will wait the number of minutes (0 disables) and randomly play an MP3 file. Red button stops the song, 7 and * keys adjust volume up and down.

MODE 2 – PIN CODE LOCKDOWN TO DETONATION

Mode 2 allows the device to be locked down using a 1-9 digit PIN code. The device can be unlocked by entering the same code again.

NOTE – ENTERING AN INVALID PIN CODE 4 TIMES WILL INVOKE THE "ANTI-HACKING" MODE, CAUSING THE DEVICE TO DETONATE AND REMOVE SAID HACKERS.

EOD Mode allows an EOD expert to bypass the countdown by guessing the PIN code. In EOD mode, the system will allow unlimited PIN guesses without detonating. Each guess will trigger a "too high" or "too low" response, allowing the player to adjust their next guess. With a 4 digit PIN above 1000, this can take on average 2 minutes to guess.

Hitting the * key gives a -/+ 200 numbers range on the display. This quickly reduces the guessing time. Tell players about this hint if you wish.

Hacking cards and canisters will disable the system immediately if those options are enabled.

GAME FLOW

The initial flow of this game, from system power on, is as follows:

1. System Powers up. Self-checks for battery level and other items are made, and warnings are played if the BB cannon is enabled.
2. Self-checks for cards are made if those options are enabled, and the system will wait until those are removed before proceeding.
3. The device pauses and waits for the proper PIN code. The countdown will not start without the PIN code. (EOD guess mode is not enabled for the initial starting PIN.)
4. Once the PIN is entered the countdown begins. The countdown may be halted by one of the following methods:
    a. Entering the PIN again pauses the countdown.
    b. Guessing the PIN with EOD Mode enabled pauses the countdown.
    c. Entering the wrong PIN 4 times WITHOUT EOD Mode detonates the device.
    d. Inserting a "hacking card" with card sense enabled disables the device.
    e. Inserting a fuel rod with "can sense" enabled disables the device.
5. If the device is disabled, the countdown cannot be restarted. If the device is paused using the correct PIN, the countdown may be continued by entering the correct PIN again.
6. The device will count down to detonation:
    a. If the two minute warning option is enabled, a two minute alert klaxon sound and voice will be heard just before 2 minutes.
    b. If the two minute ambient music option is set to a song number other than 0, that song will be played. Recommendation is to play track 36, which ends exactly at 2 minutes.
    c. If the BB Cannon is enabled, at 30 seconds the compressor will start up and pump up the chambers.

7. At detonation the device will sound for the set alert period and stop.
8. After detonation, the device will wait the number of minutes (0 disables) and randomly play an MP3 file. Red button stops the song, 7 and * keys adjust volume up and down.

MODE 3 – REPEATING COUNTDOWN TO DETONATION

Mode 3 allows a somewhat modified scenario – Once you start the countdown, it continues until the device detonates and cannot be paused. You can "reset" the countdown by pressing the red button, which causes the countdown to restart from the beginning. You can also disable the device by using the card or fuel canister, if you have enabled those options. Without the disable card or canister, the device can never be disabled, and must constantly be reset to prevent detonation.

Note that if you enable the card defeat or canister option, those devices must NOT be present or installed when the countdown starts (or it would immediately end). Of course, it is possible to put a dummy card or fuel rod in the device, which does not have the magnets installed, in order to allow normal operation.

EOD mode does not have any effect on this game mode.

GAME FLOW

The initial flow of this game, from system power on, is as follows:

1. System Powers up. Self-checks for battery level and other items are made, and warnings are played if the BB cannon is enabled.
2. Self-checks for cards or canisters are made if those options are enabled, and the system will wait until those are removed before proceeding.
3. The device will wait until a red button is pressed to begin the countdown. If the locator option is enabled, it will also beep once every 3 seconds to aid players in locating it. Once players start the countdown the locator will stop.
4. The device will count down to detonation:
    a. If the two minute warning option is enabled, a two minute alert klaxon sound and voice will be heard just before 2 minutes.
    b. If the two minute ambient music option is set to a song number other than 0, that song will be played. Recommendation is to play track 36, which ends exactly at 2 minutes.
    c. If the BB Cannon is enabled, at 30 seconds the compressor will start up and pump up the chambers.
5. Detonation can be disabled by inserting a bypass "hacking" card, or inserting a canister, assuming those options are enabled in programming (card sense, and can sense).
6. The countdown can be "reset" and forced to restart the countdown from the beginning by pressing the red button.
7. At detonation the device will sound for the set alert period and stop.

8. After detonation, the device will wait the number of minutes (0 disables) and randomly play an MP3 file. Red button stops the song, 7 and * keys adjust volume up and down.

MODE 4 – NUCLEAR FUEL CHARGE AND COUNTDOWN

This mode allows the charging and arming of the device using a suitable Nuclear Fuel Rod/canister. You should start this mode with the canister REMOVED. You can give the canister to the players or make them find it. Once the nuclear fuel charge is loaded, a countdown begins. The countdown can be cancelled by attaching a suitable canister and transferring the charge back.

NOTE – THE FUEL ROD CANISTER MUST HAVE THE REQUIRED MAGNETS AND COMPONENTS IN ORDER TO WORK WITH THIS MODE. JUST ANY CYLINDER WILL NOT WORK!

EOD Mode allows an EOD expert to bypass the countdown by holding the red button for 4 minutes.

Canisters will not "disable" the system countdown immediately, but are used in a "discharge" sequence and end up disabling the countdown eventually. Hacking cards will disable the system immediately if that option is enabled.

GAME FLOW

The initial flow of this game, from system power on, is as follows:

1. System Powers up. Self-checks for battery level and other items are made, and warnings are played if the BB cannon is enabled.
2. Self-checks for cards are made if those options are enabled, and the system will wait until those are removed before proceeding.
3. The canister must be removed from the device and the red button pressed to set the unit up for game play. THIS IS DONE BY THE ADMIN. Once this is done, the device is ready to accept a canister from a player to start the arming sequence. You don't have to have the canister to start this mode, but if you do, and it's present on the device, you do have to remove it to start the game mode.
4. The device asks the player to insert the canister, which starts the prime process. This process takes 10 seconds.
5. The device asks the player to hold the red button to charge the device. This takes 10 seconds.
6. The device asks the player to remove the canister to start the countdown.
7. Once removed, the countdown starts.
8. The device will count down to detonation:
    a. If the two minute warning option is enabled, a two minute alert klaxon sound and voice will be heard just before 2 minutes.
    b. If the two minute ambient music option is set to a song number other than 0, that song will be played. Recommendation is to play track 36, which ends exactly at 2 minutes.

c. If the BB Cannon is enabled, at 30 seconds the compressor will start up and pump up the chambers.

9. Detonation can be disabled by inserting a bypass "hacking" card (card sense must be enabled), or inserting a canister and following the discharge process. EOD mode allows disabling the device by holding the red button for 4 minutes continuously.
10. If the EOD mode is not enabled, and the red button is pressed in an attempt to bypass the device but a fuel rod is NOT present, a hacking attempt is triggered and an accelerated countdown begins.
11. At detonation the device will sound for the set alert period and stop.
12. After detonation, the device will wait the number of minutes (0 disables) and randomly play an MP3 file. Red button stops the song, 7 and * keys adjust volume up and down.

SYSTEM MAINTENANCE

OVERVIEW

System maintenance includes items such as pre-operation checks, battery charging and replacement, and fuse replacement. The system is generally built to handle normal use but any time the device is dropped, kicked or knocked over, an inspection of the internal connections and components should be performed.

Modifying the code operation – aside from the configuration options in the programming menu – is not covered in this manual. The unit uses C++ Arduino style programming language with a Teensy 3.2 LC controller and a DFRobot MP3 player device, and does support direct USB connections for reprogramming. Please contact the D14 owners for questions about the program source code or design documentation.

TROUBLESHOOTING STRANGE BEHAVIOR

Note that if a program mode is NOT performed on power-up, the last operating mode is re-started.

Strong RF emissions near the device have been proven to cause undesired operation, including hanging the controller, erroneous keypad entry, etc. It is recommended that RF transmitters are NOT operated within several feet of the device.

If the device display becomes garbled or appears to hang, power the system down with the access key, then power it back on. The last program will be restarted.

If the strobes or air horn devices sound continuously, the MOSFET devices may have failed. MOSFET devices typically (eventually) fail as a short circuit. Turn off the controller with the key switch, and remove the right access panel to access the main system fuses, or disconnect the battery from the control or compressor or other components. Pulling fuses is recommended.

In the event of continuous air horn operation, use hearing protection when trying to disable the system. Do not attempt to disable to compressor or horns directly, rather, remove power from the compressor by disabling main power or removing the fuse.

OPENING THE CASE

The case should be opened using the round screen panel on the right side of the main tube body (when facing the keypad). Phillips head screws can be unscrewed half-way and the cover removed. Once that is accomplished, the internal component board can be pulled out to the right for service.

Note that to reinstall the main power board, you must also remove the left cover and guide the power board into the correct position, under the holding tab.

ALWAYS DISCONNECT ONE OR BOTH OF THE MAIN BATTERY CONNECTORS WHEN PERFORMING SERVICE.

MOSFETS AND SEVERAL COMPONENTS ARE 'GROUND-SWITCHED'. WHICH MEANS THEY RECEIVE CONSTANT POWER FROM THE BATTERY + RAIL, AND GROUND IS SWITCHED BY THE MOSFET DEVICES. THIS MEANS THE MOSFET TABS AND HEAT-SINKS WILL NORMALLY BE RESTING AT +12VDC DURING OPERATION.

ACCESSING THE POWER BOARD COMPONENTS

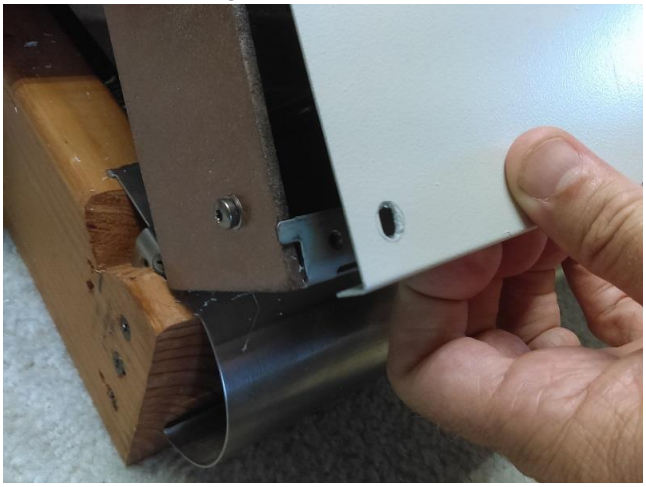
1. Using a phillips screw driver, unscrew the 3 screws on the right tube cover. If you only unscrew them half-way you should be able to use them to pull the cover out.
2. Remove the cover, exposing the internal carrier board and connectors. Space is tight, so use a flashlight to look into the tube and slide the board out, rotating if needed to clear the cable feeds coming in the top of the tube. Gently slide out the borad half-way, then unplug the connectors if you intend to completely remove it. If you only need fuse access you don't need to slide it out further. If you need to change the battery you should remove the entire board.
3. Details on the internal components and a component list is available in the specifications section of this document.
4. Reinstalling the board requires you to remove the left cover. Slide the board thru the tube until it reaches the tang that holds it down on the left. Move the metal tang around until it will slide over the board.
5. Push the board in the rest of the way until it bottoms out on the left holder. The board should be level, resting on the screw on the left (prevents it from rotating counterclockwise).
6. Push the right cover in and drive the screw in thru the tube and into the mounting wood base.

ACCESSING THE CONTROL PANEL INTERIOR

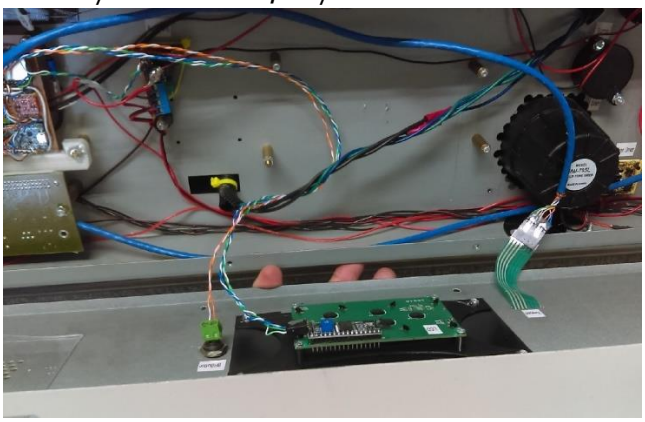
1. Using a suitable Torx bit, unscrew the 12 screws on the top and bottom of the front cover.

2. Remove the card from the top left of the control box.

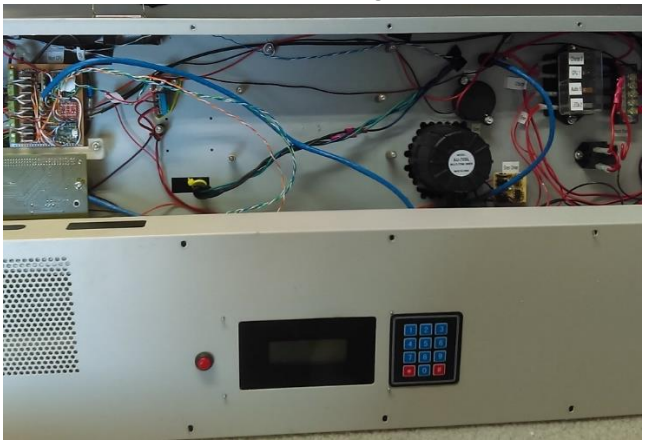
3. From the bottom, gently lift the front cover up:



4. Slide the cover up to clear the connectors on top of the box, but DO NOT move the cover too far away from the unit, as you need to disconnect the LCD button and keypad.



5. It is possible to rest the cover against the front of the unit without disconnecting cables.



6. Details on the internal components and a component list is available in the specifications section of this document.

BATTERY CHARGING

Connect a business power cord to the right end of the control box, and plus the other end into a typical 120VAC US outlet. The on-board SLA battery charger may take several hours due to battery capacity (it is a larger 8A-Hr SLA). Battery is considered charged when the voltage reaches 13.6 VDC. Battery voltage less than 10.5V is not recommended and can damage the SLA battery.

NOTE – THE INTERNAL CHARGER IS INTELLIGENT, AND WILL SWITCH TO FLOAT MODE AUTOMATICALLY. THE DEVICE CAN BE LEFT PLUGGED IN INDEFINITELY WITHOUT CAUSING BATTERY DAMAGE.

Any white crusty residue on the "top" of the battery, or swelling of the battery indicates internal failure and requires the battery to be disposed of immediately. A Sulphur or rotten-egg smell also indicates overcharging and possible battery damage.

BATTERY REPLACEMENT

As this unit uses a Sealed Lead Acid Battery (SLA), please replace the battery with a suitable sized replacement. SLA batteries can be mounted in any position. The existing cell is a 7 or 8 Amp-Hour 12V battery. Power is marked as Red for +12V, and black for Ground.

Unscrew the bracket holding the battery down and one or more of the side screws to free the battery. When tightening the new battery down, ensure there is a very small amount of "wiggle-room" so the plastic battery case is not being crimped. Overtightening can crack the new battery case.

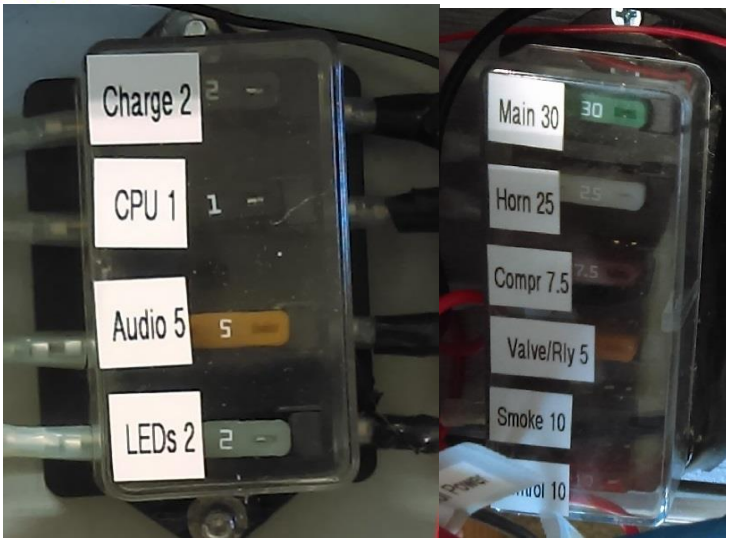
This is a standard battery design, and any battery with similar specifications can be used – whether it was sold for UPS, deer-feeder, telecom, or general use.

As the battery uses lead, proper disposal should be performed. Do not discard the battery in normal trash. Dispose of or recycle according to local ordinances.

FUSE REPLACEMENT

Fuses should not typically blow unless an internal short develops in the device or a component. Before replacing a fuse, investigate the component that blew the fuse and verify it is not malfunctioning. If the main 30A fuse blows, disconnect all other fuses (and keep track of which wires go with which fuse) and reconnect components one fuse at a time to isolate the cause.

Component	Fuse Size	Purpose
Main Battery 30	30A	Main power for all systems.
Air Horn 25	25A	Power for the Air Horn compressor (high current!)
Compressor 7.5	7.5	Power for the air compressor for BB Cannon.
Valve/Relay 5	5A	Power for the Air valve and Relays.
Smoke 10	10A	Power for an optional component, originally intended for Smoke.
Control Box 10	10A	Power for the microcontroller, display, LED, Sound.
Charge 2	2A	Safety fuse for the power from the battery charger, to the power board.
CPU1	1A	Power for the Arduino and MP3 device board.
Audio5	5A	Power for the Audio Amp.
LEDs2	2A	Power for LED Strobe lights.



AUXILLARY INFORMATION/SPECIFICATIONS

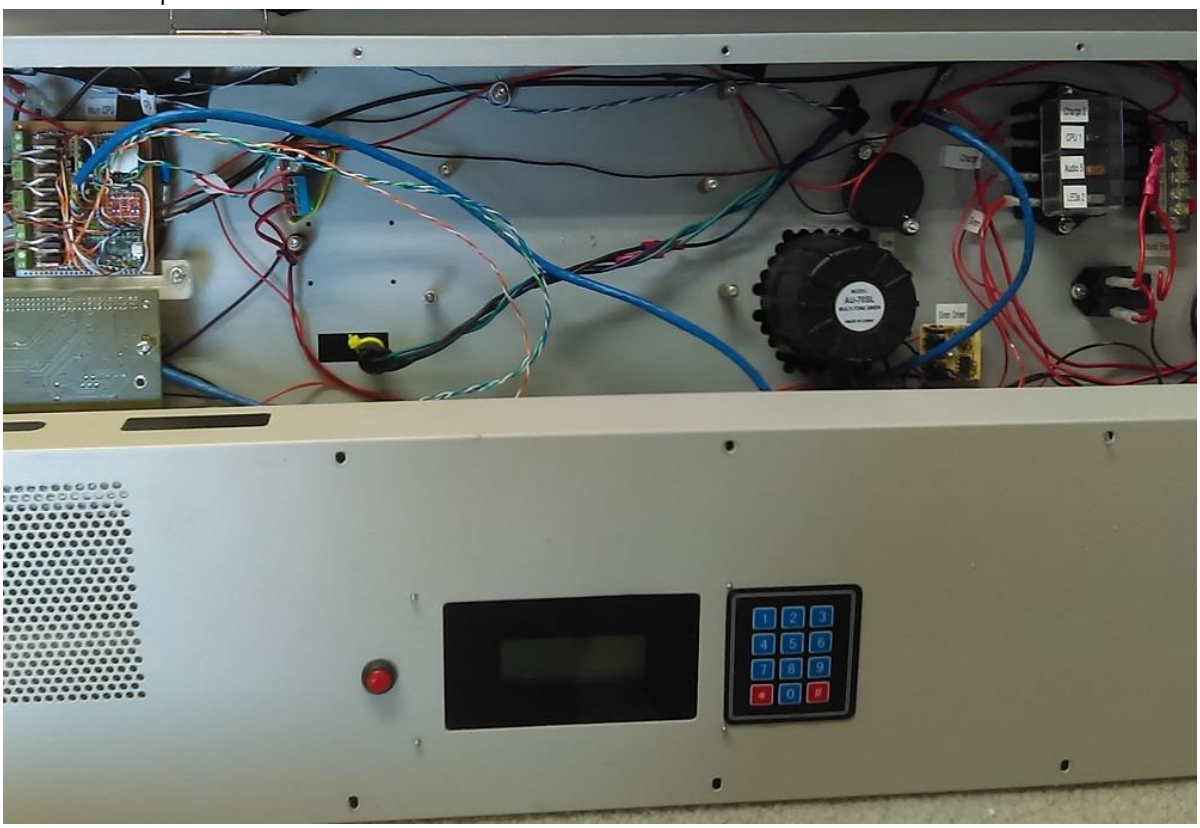
INTERNAL COMPONENT LIST

The following components are used in this device.

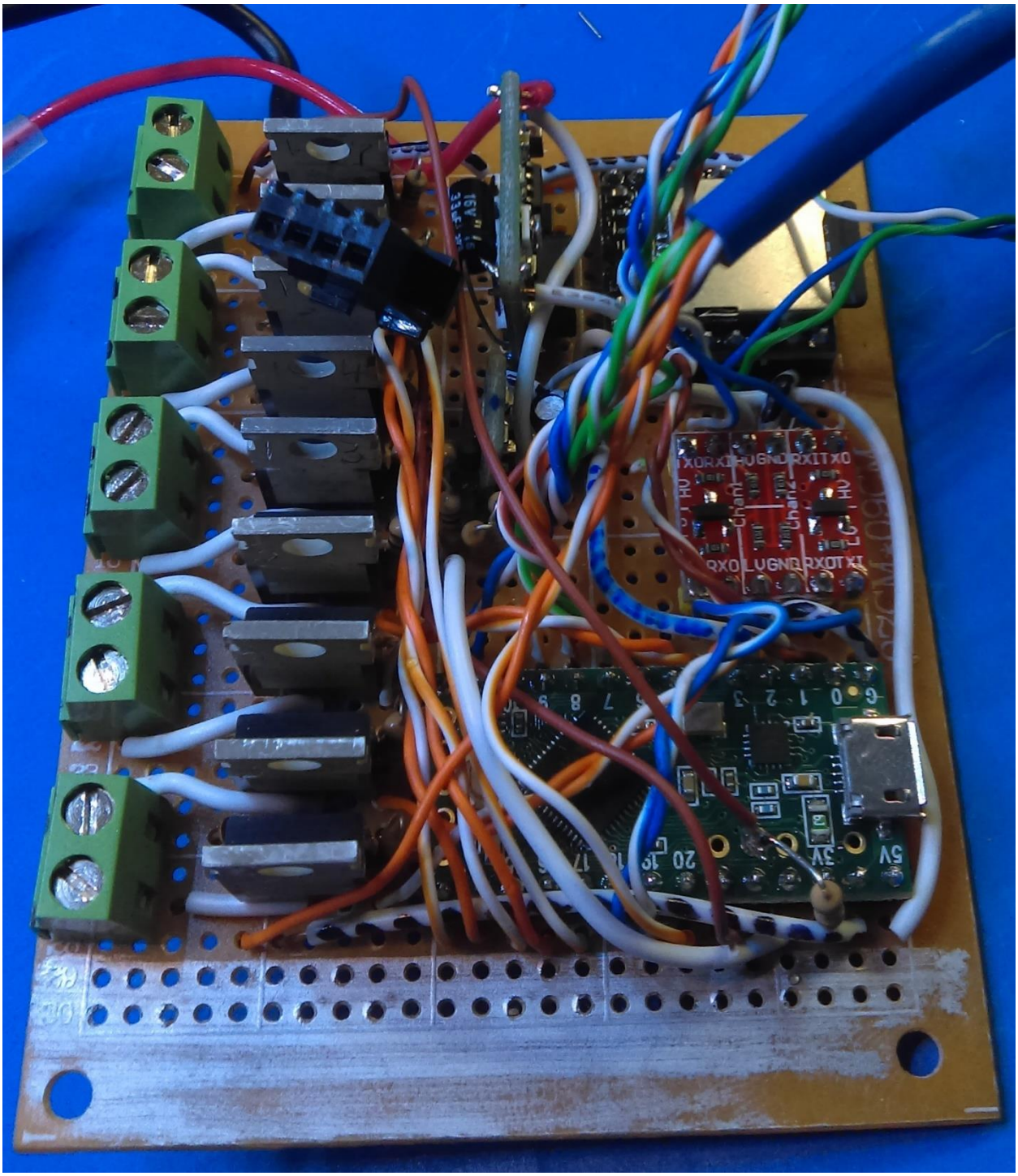
Component
Main Battery. SLA 12VDC 7 or 8 AHr battery. (UB1280 or similar) 30A Main fuse on battery.
Power board Fused power connection block. Most high power component fuses are located here.
Ground Distribution bank. Used to ground various parts of the system.
Relay bank. Clamping Diode installed across coils of each relay. If you replace this device use a suitable clamping diode to shunt spikes and connect with correct polarity. Relay is 30A, 30VDC rated. 12V coil. Relays are labeled for purpose. Equipment is ground switched or positive switched depending on system. Relay coils are ground switched.
Air horn compressor. Loud on its own, bolted to the carrier board. Uses a 20A fuse. No maintenance possible on this part.
Air Horns. Dual low frequency horns, zip-tied for convenient removal/replacement.
Deans connectors – connecting compressor, main control box power, and main power.
Cat5 Network connection. Used to run relay control wires from control board.
Keypad/Control box. Teensy 3.2 LC controller with custom program, keypad and LCD I2C interface, MP3 serial interface and power regulation as well as control MOSFET switches are located on the control board to the left. On-board MP3 player uses a micro SD card to

store sounds and audio. MP3 amplifier is near main control board. Siren driver board is next to the siren. Beeper is above the siren. Control system fuses and 120VAC battery charger. Main power switch turns on the 30A relay in the control box to power up control electronics and LED/audio.
LCD display – I2C connected to CPU board, blue, 4x20characters.
"Red Button" – main button used to arm/disarm/enter reset mode. Hold this button when powering system up to reset the device.
Power Switch. Switches power to control box only – however this will generally turn off all components. The charger will operate regardless of system power switch state.
Keypad – a standard 3x4 numeric keypad.
LED rings – Blue and RED alternating LED displays.
Speaker tubes – Speakers are outdoor rated and waterproof but may not survive if water is left standing on the speakers. If rain is encountered, cover the unit and tilt over to ensure no water collects in speakers or tubes.
White LED strobes – located above speakers.
BB Cannon tube – a simple air powered device. Air fires from the bottom bb reservoir across a small gap into the main tube. BBs are sucked up into the air flow and out the unit. Any BBs can be used, as long as they are not too dirty.
Air Valve – a sprinkler valve located under the unit to release air on command by the CPU.
Compressor box – houses a small 12VDC car compressor, limit switch (50PSI) and safety valve plus a gauge. Do not block the inlet or outlet near tanks.
Air tanks – repurposed propane tanks (cleaned), with no neck valves. Tank safety valve is retained but should never be used as the safety limit valve is set to a much lower 100PSI level and should always release first.

Internal Components: Control Box:



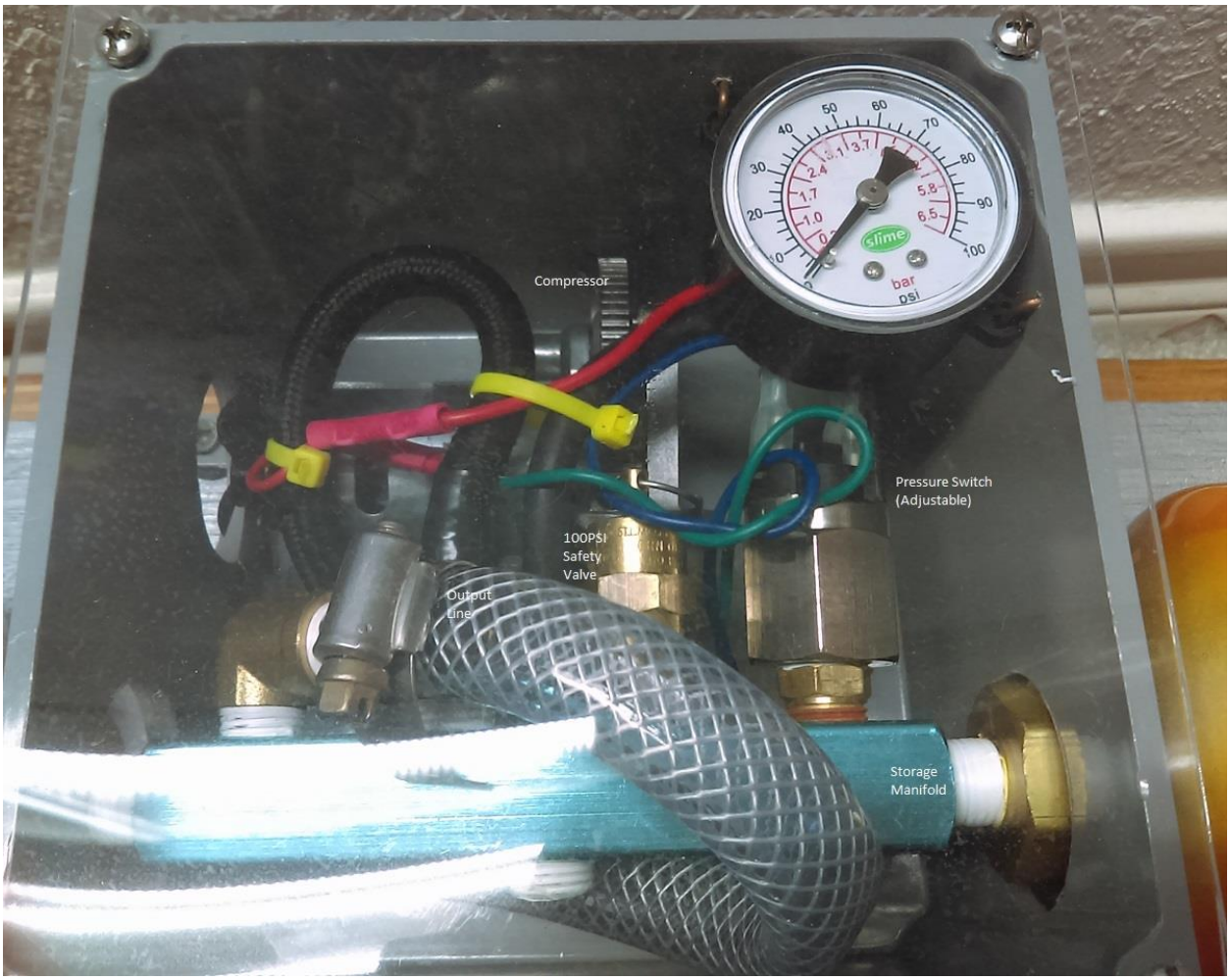
Main CPU Board



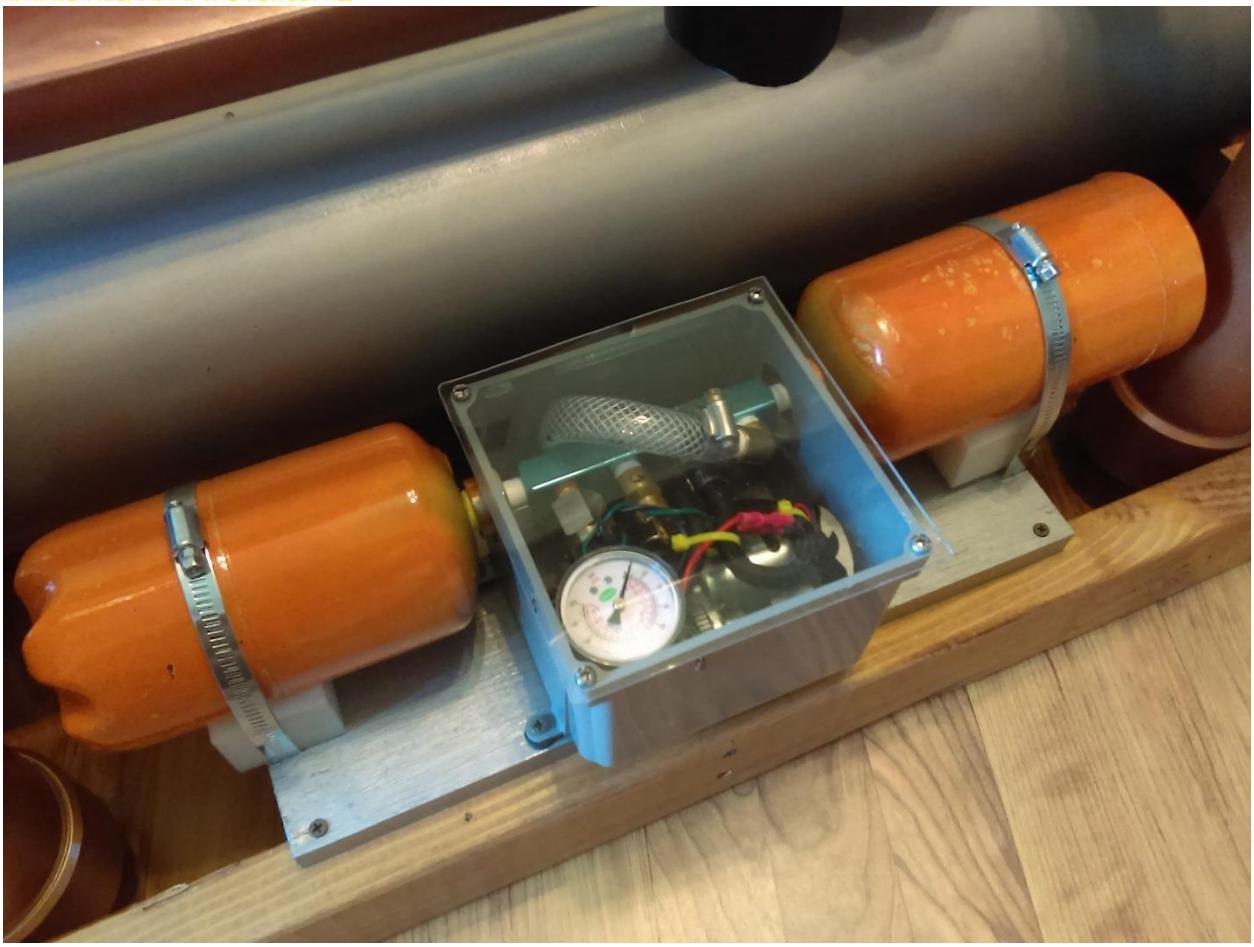
Main CPU board, with Teensy 3.2 LC at the bottom, level adapter above that, MP3 DF Robot board (with SD Card) above that. The center contains a 5V regulator (do not adjust!) and 3.3v regulator board,

both mounted on end. The left side contains 9 channels of MOSFET drivers with screw down terminals. Cables run to can and card sense connectors, BRB connections, LCD connections, MP3 connections and Keypad connections as well as power and ground. Since the unit switches ground to devices, the ground lead is much larger than the power lead.

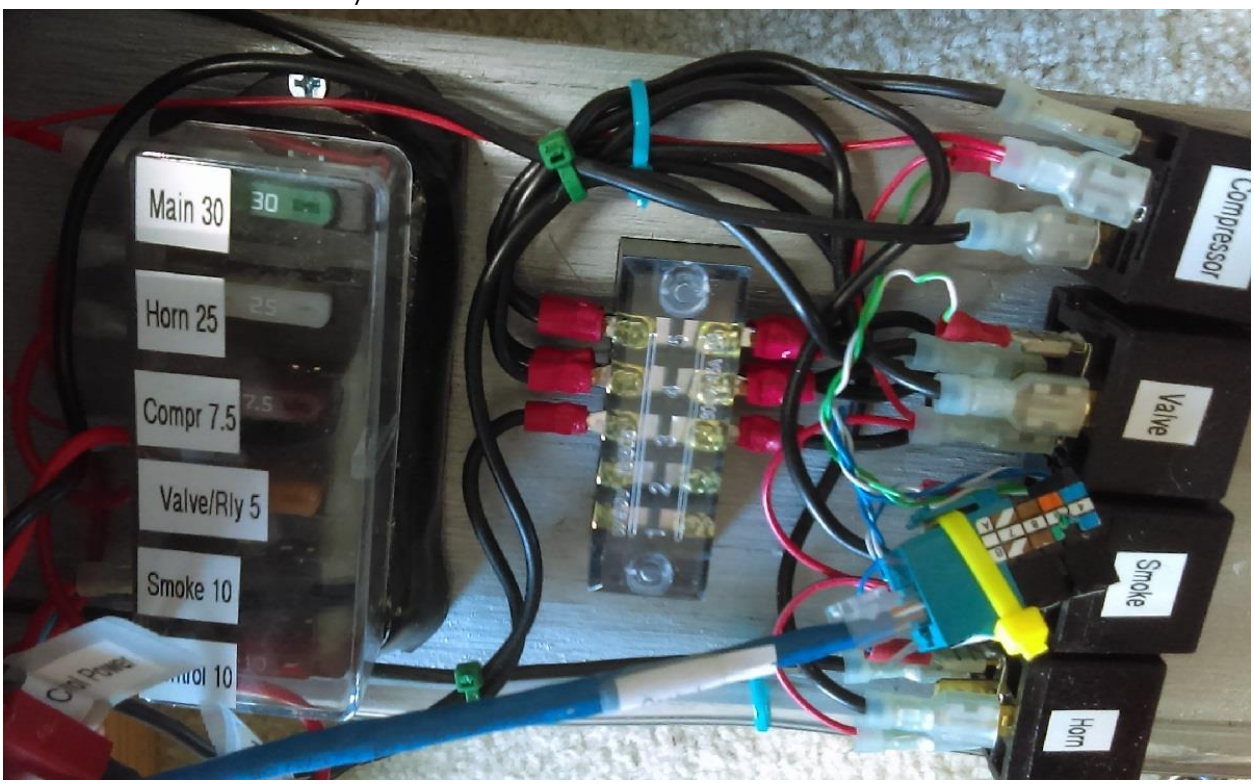
Compressor Box:



Compressor, Pressure Switch (50PSI setting, adjustable), safety valve (100PSI), gauge, manifold to tanks. Tanks are cleaned recycled Propane canisters, so some odor is present (it is not dangerous). There is also a sprinkler valve under the main tube and pipe to the (left) bb Cannon tube.

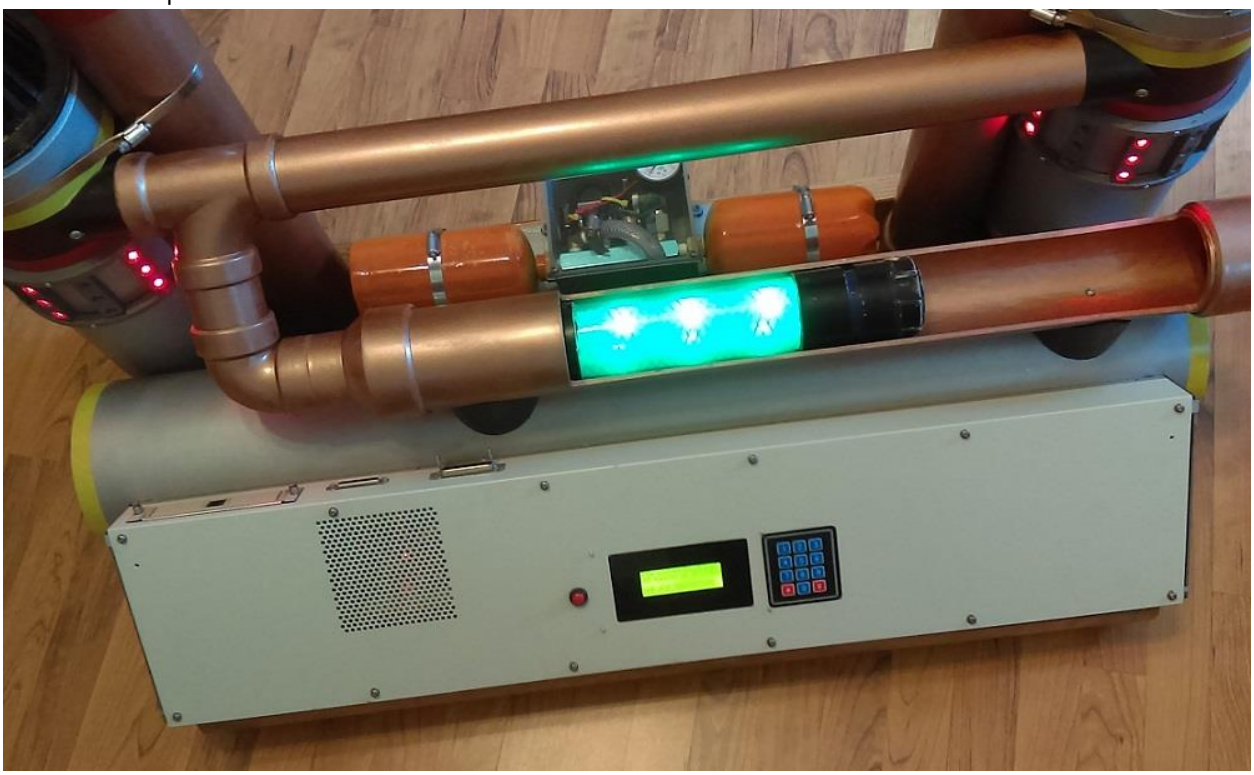


Power Board: Fuses and Relays



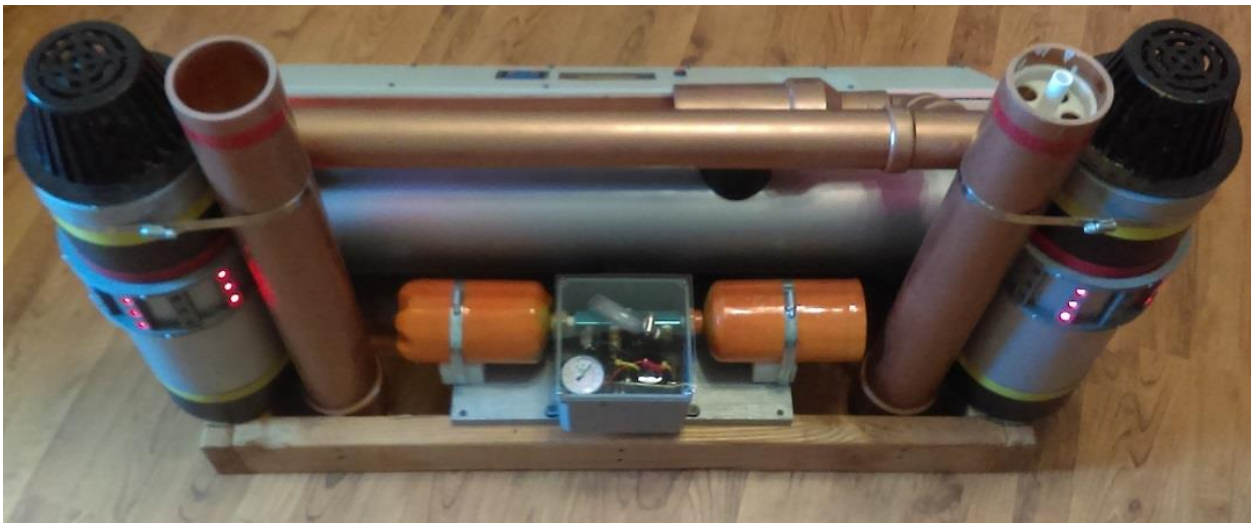
Fuses for major systems, ground supply block, relay bank and control cable connection are shown.

External Components: Front view



Front control panel, showing keypad, LCD display, and Big Red Button. Optional fuel rod prop is in the canister tray. Red LEDs are displayed on speaker tubes (Blue LEDs are in between reds). Compressor and tanks are visible in the background.

Rear View



Compressor, tanks, left and right speaker towers, left tube (unused, could store a fuel rod prop or be used for future smoke application), and right BB Cannon tube. White LEDs are under speaker caps.

Miscellaneous Specs:

Weight: 28 Kg or 62 lbs.

Width: 1.17M 46 in.

Depth: 0.56M or 22 in.

Height: 0.69M or 27 in.

Power Supply: Internal 12VDC SLA battery, 7AHr.

Power Draw: Detonated – 23A Max, intermittent. 1A Idle. 2A countdown w/strobes, intermittent.

Theoretical Battery Life – 8Ahr/(1A average)=8 hours? Exact time estimates depend heavily on options chosen and volume of MP3 audio system.

Date of Creation: August 31st, 2016.

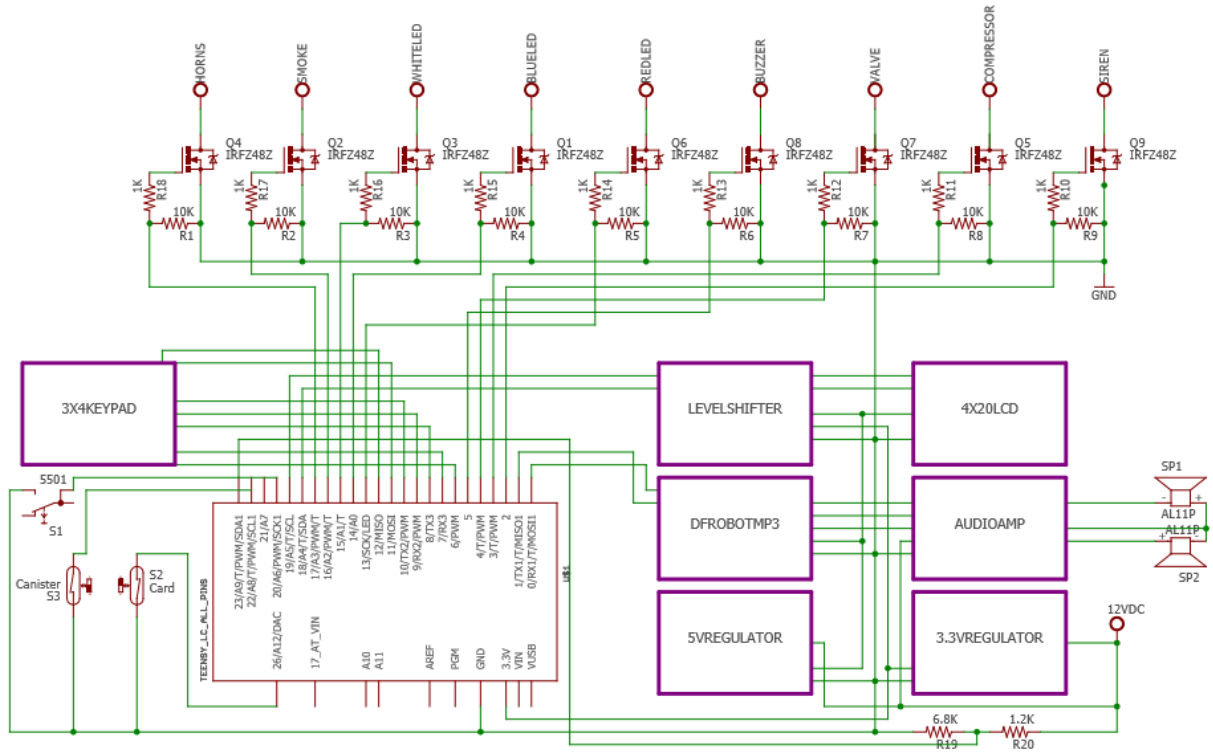
Paint Codes: RUST-OLEUM Hammered spray paints, Silver 7213, Copper 210849

Teensy LC Pinout:

Pin	Mode	Description
RX1,TX1	Dig I/O	MP3 (DFRobot) Serial control.
D2	Dig Out	Siren Out to MOSFET.
D3	Dig Out	Compressor Out to MOSFET.
D4	Dig Out	Air Valve Out to MOSFET.
D5	Dig Out	Buzzer Out to MOSFET.
D6-D12	Dig In	Keypad input Pin6-9: R1-R4, Pin 10-12: C1-C3
D13	Dig Out	RED LED Out to MOSFET.
D14	Dig Out	BLUE LED Out to MOSFET.
D15	Dig Out	WHITE LED Out to MOSFET.
D16	Dig Out	Smoke Out to MOSFET. (not enabled, for expansion)
D17	Dig Out	Air Horns Out to MOSFET.
SDA0, SCL0	Dig I/O	3.3v I2C to level shifter, to LCD.
D20	Dig In	Big Red Button input.
D22	Dig In	Canister/Fuel Rod sense input.
A9	Analog In	Battery Volt Sense, through divider (6.8K over 1.2K).
D24	Dig In	Card sense input.

Fuel Rod/Canister modification: The fuel rods or canisters must have a strong magnet to trigger the sensor in the bottom left canister slot (over the left support). A small strong magnet is embedded in the bottom of the canister slot to trigger Fuel Rod sensors as well.

Schematic:



QUICK REFERENCE SHEET

Print copies of the following sheet for in-field reference.

Program Mode: Hold red button while turning device on with key switch. Wait for "Programming Mode" to be displayed or announced before releasing button.

Program Selection: The following program options are available.

1. Game Mode Selection:
    a. Countdown Timer to Detonation
    b. PIN code Lockdown to Detonation
    c. Repeating Countdown to Detonation
    d. Nuclear Fuel Charge and Countdown
2. Pre-Countdown Locate Beep: Prior to starting a countdown, the device can "beep" every 3 seconds to aid players in locating it. This mode allows you to hide the device on the field and help players find it easier.
3. Countdown Strobe: Enable or disable the strobe to flash every second during an active countdown.
4. Countdown Beep: Enable or disable the beeper to sound every second during an active countdown.
5. Countdown Time: Countdowns can run from 1 minute to 1000 minutes.
6. EOD Mode: Explosive Ordinance Disarming Expert Mode enable or disable. In PIN game, EOD means guessing a PIN will tell you high/low and never detonate from a bad PIN. In Nuclear Canister mode, the system can be disarmed by holding the red button for 2 minutes without interruption. Note that this mode is SEPARATE from the card disable option.
7. Canister Sense: Allows using a suitable fuel rod to disarm the device instead of a card.
8. Card Sense: Enabling this mode allows a "hacking card" to immediately disable the device during countdown.
9. PIN: Enter a 1-9 digit PIN. If EOD mode is enabled, a 4 digit PIN should be used at the minimum.
10. Two Minute Warning: Enable this to hear the 2 minute klaxon sound and voice warning.
11. Two Minute Song: The MP3 song number to play as a two minute ambient music selection. MP3 song numbers can be found in the hidden MP3 Jukebox mode. (Ask)
12. Alert Duration: Number of seconds (1-240) that the alarm sounds when the device is detonated.
13. BB Cannon: Enable or Disable the BB Cannon when the device is detonated. Note that the compressor will also start ~30 seconds before end of countdown if BB Cannon is enabled.
14. MP3 Juke Box Mode: Set this to O to disable, or number of minutes between songs (5 or more suggested) if you want the device to randomly choose an MP3 song to play after being disabled or detonated.
15. Main Volume: Volume level (1-30) of most announcements. Warnings and effects may be louder than this level and cannot be adjusted. During MP3 play, the 7 and * keys allow volume up/down adjustments independent of the main volume setting.

DISCLAIMER AND WARNINGS

This device is designed to enhance game play in an Airsoft scenario game. It is not dangerous or life threatening, assuming normal Airsoft game play rules are followed. Following typical rules, *especially eye protection*, when the BB Cannon is enabled should protect players from injury. The device is not intended to be moved during game play, especially by less than 2 people. Always instruct players to keep clear of the BB Cannon at all times, regardless of whether the system is powered or armed. When not in use, cover the cannon to prevent debris from entering or protect if accidental discharge occurs.

While it should be readily apparent to anyone this is a prop, based on design, it is still prudent to cover and conceal the device from general public view when not in use on the playing field.