

Skylighter

Fireworking Safety, the Law, and You

Fireworking Safety, the Law, and You

In this material I've covered many safety issues involved in making fireworks [the introductory essay to Kyle Kepley's *The Pyrotechnist Survival Guide*](#), Bill Ofca's Fireworks Safety Manual, and Dr. Takeo Shimizu's treatise on Preventing Accidents.

Much physical suffering on our part and that of our loved ones can be avoided if we heed the advice in those pages. I like to go back and review them regularly to see how well my operations are conforming to those recommendations. But there is another very significant kind of pain and suffering us and our families may have to endure unless we pay attention to a different set of precautions as we embark on this new fireworking hobby.

I'm going to go over what it takes to make fireworks legally, and I'll even show you how to make a magazine inexpensively to use for legal storage of the fireworks you make.

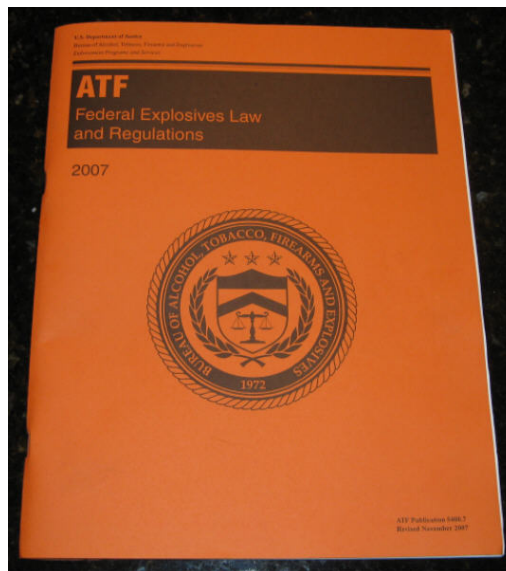
Federal, State, and Local Laws Pertaining to Hobbyist Fireworks Manufacture

The US Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE) is charged with regulating explosives activities in the United States. Their regulations can be found in *ATF Federal Explosives Law and Regulations*, commonly called the Orange Book because of its orange cover.

Here is a link to a free online, PDF version of the Orange Book:

<http://turbo-pyro.s3.amazonaws.com/ATF-Orange-Book.pdf>

The book can be obtained from the BATFE directly, also, and from Skylighter.



BATFE's "Orange Book"

Individual states either defer to Federal explosives regulations or develop their own explosives laws. Local governments such as counties, cities, and townships can adopt their own sets of laws governing explosives and their manufacture.

You might be saying right about now, "*What am I getting myself into?*" The simple answer is that you've gotten yourself into a serious hobby and art form, one which can cause personal injury and property damage, and one in which the government takes an interest, unlike knitting or stamp-collecting.

"Well, the heck with them. I don't care about their stupid laws," you might reply. Well, guess what. The various governments don't care whether you and I consider the laws stupid. *They* care about the laws and *they* care about whether or not we are complying with them. You'd better believe it.

We could sit around for hours or even days, debating this law or that one, which one is just or unjust. But that won't change the *fact* of the existence of both the law and the agency, which enforces it. The question is not whether the law is just or not, or whether or not I agree with the law.

The question becomes a simple one: *"Am I willing to suffer the consequences if I am caught breaking the law and prosecuted? Is my family willing to suffer those consequences along with me? Am I willing to ask them if they are willing to suffer those consequences?"*

There have been many pyros who have been caught breaking the laws concerning the manufacture and storage of fireworks. They have suffered

Fireworking Safety, the Law, and You

imprisonment, high attorney fees, exorbitant fines, broken marriages, and loss of property.

In the end a law is simple. *“We the people declare this activity, done this way, to be illegal. If you are caught doing it you will suffer these consequences.”* A law states just that and only that. It simply states, such and such an action is illegal, and if you are caught doing it you may suffer this punishment.

So, the choice then becomes simple. *“Am I willing to comply with the law, or break it and risk those consequences?”* And, there are several different ways to answer that question.

1. Yep, I'll comply with the law and not take the risks involved in breaking it.
2. Nope, I'll not comply with the law. I'm going to engage in this activity in an illegal manner, and I'm willing to risk those consequences. But, I'm not gonna tell my wife I'm taking that risk with our money and property, or give her the choice of whether or not she's willing to take that risk.
3. Nope, I'll not comply with the law, and I'm willing to risk those consequences, and I have discussed it with my wife and family and they are willing to back me up in this activity and risk those consequences, too.

But, comply or not, we need to take that action with an awareness of the consequences of our actions, and a willingness to face those consequences like “men”. (Most fireworkers are men, so I'm comfortable using that term. No disrespect to wimmen fireworkers, though.)

I said in my safety essay mentioned in the first paragraph, *“When we first get into this, we really don't know how serious a pursuit it will become for us, do we? How much should we invest in tools and a workshop if it turns out to be only a passing curiosity? If we progress in the fireworks hobby, our investment in it and in the tools and facility used for it, progresses along with it. Our safety precautions usually end up tagging along a bit behind our activities. That is dangerous.”*

Now, in that paragraph simply replace the word “safety” with the word “legal”, as in *“our legal precautions usually end up tagging along a bit behind our activities.”*

The danger in doing that is that we do indeed risk the sorts of “dangers” mentioned above: imprisonment, high attorney fees, exorbitant fines, broken marriages, and loss of property. As we make choices concerning our activities and whether or not they comply with those laws, it would be wise to become educated about the laws, the consequences of breaking them, and our responsibilities to ourselves and our loved ones.

What Does US Federal Law Say About Hobbyist Fireworking?

Fortunately, US Federal law is pretty straightforward and simple when it comes to hobbyist fireworking. Once again, refer to the ATF Orange Book:

Page 64, Paragraph 37. *“When is a manufacturer’s license required?”*

“Persons who manufacture explosives for their personal, non-business use are not required to have a manufacturer’s license. However, no person may ship, transport, cause to be transported, or receive explosive materials unless such person holds a license or permit.”

Page 68, Paragraph 72. *“Who must comply with the storage requirements?”*

“...all persons who store explosive materials must store them in conformity with the provisions of Subpart K of the regulations...”

Pages 47-53, Subpart K – Storage

Legal Storage

This section details storage which is in conformity with the regulations and which will satisfy the BATFE’s requirements. Because no license is required by the BATFE, this storage might never be known about by them or inspected by them.

But if a person is caught storing explosives without such compliant storage, the BATFE then has the right to prosecute that person. And, typically, they do. These are the cases you hear about in the news if the Feds are prosecuting somebody: they were storing explosives illegally, or they caught the person transporting explosives without a license or permit.

This is another important point. While a person can make explosives for their own personal use, provided that they store them in a compliant manner, they may not transport them legally unless they have an ATF license or permit. And, that’s even across town to the test-shooting site.

When traveling to PGI (Pyrotechnics Guild International) or local-club events, transportation-coverage for members might be supplied. But, if you decide to transport your homemade fireworks without a license or permit, and you get stopped and searched for whatever reason, or if you have an accident and the explosives are involved in some destruction, God Help You, because the law won’t.

Fireworking Safety, the Law, and You

By the way, the US DOT (Department of Transportation) only regulates “in-commerce” transportation, and does not concern itself with the above mentioned regulations concerning the BATFE’s requirements to only transport explosives under a license or permit. At least, that’s the philosophy they appear to have been operating under so far.



Note: It’s useful to mention that all of this is *my* best understanding of the current situation under the law. Things can change, and the laws are always up for re-evaluation. I am not a lawyer, just a hobbyist trying to be as informed as possible about the multitude of laws surrounding us, and the numerous “alphabet soup” agencies charged with enforcing those laws.

If in doubt, consult an attorney. But remember that unless they are fireworks or explosives specialist for your area of the country, they can only offer their “best opinion” for you. Quite often the law is simply not all that clear, and is left to the individual “authority on site” to render a personal interpretation of it.

Local and State Laws Covering Fireworks Manufacture

It is impossible for me to even try to address the myriad of local and state laws governing the manufacture of fireworks. Suffice it to say that the same sort of reasoning and responsibilities mentioned above with regard to federal laws, also pertain to state and local laws.

If you don’t research those laws and make informed choices regarding them, you might run afoul of a state or local Fire Marshal who simply does not have a sense of humor about all of this “hobbyist fireworking.”

BATFE Manufacturing Licenses

So, if the Feds do not require us to obtain a license to make explosives for our personal use, as long as the restrictions on storage and transportation mentioned above are complied with, “Why Get One?”

Well, that’s an interesting subject. We’ve mentioned the BATFE, DOT, State and Local agencies, and now another of those “acronym named” agencies comes into play.

The Consumer Products Safety Commission (CPSC) seems hell-bent on putting hobbyist fireworking and pyrotechnics supply houses out of business. Despite the BATFE’s declaration that no license is required for such activities, the CPSC has repeatedly forced pyro chemical suppliers to not sell more than very limited quantities of certain chemicals and supplies to unlicensed individuals.

On top of that, even though there is a perfectly valid and available “Type 50 – Manufacturer of Fireworks” license available from the BATFE, the CPSC has told the pyro supply houses that only a “Type 20 – Manufacturer of High Explosives” license is acceptable for purchases of certain items.

Go figure. I personally don’t mind trying to get informed about the law and trying to abide by it, but man, sometimes “they” sure don’t make it easy.

So, many pyro-enthusiasts are biting-the-bullet and getting their BATFE Type 20 licenses. A background check is required, and the resulting “Letter of Clearance” must be obtained. Compliant storage, as mentioned above and described in the following section, and a simple approved work-site, such as a picnic table, are necessary.

A form must be filled out and a relatively small fee must be paid. There’s an interview, fingerprinting, and a security check. And that’s about it. You don’t have to “qualify,” be tested, nor have any particular skills or background. The BATFE is not our enemy, and if we are willing to work with them, they definitely don’t view us as their enemy.

The license covers us for materials purchases, for transportation issues, and for general peace-of-mind. I personally consider it to be a good investment, if local and state laws will allow a license to be obtained.

BATFE Compliant Storage

As mentioned already, Subpart K – Storage, in the Orange book details the BATFE’s requirements for storage, regardless of whether we have a license. Requirements for regular inspection, by the owner, of magazines to ensure that they have not been tampered with, are detailed. Housekeeping, smoking, repair, lighting, and various other issues are also addressed in this section.



Note: Interestingly, the requirements for keeping “Records and Reports” which are detailed on page 37 pertain only to “licensees and permittees.” The questions and answers regarding the requirements for “Recordkeeping,” back on page 67-68, address only licensees and permittees, as well.

So while there may not be specific requirements for recordkeeping concerning the stored explosives for a non-licensed hobbyist, it’s probably a good idea to keep a log of the weights of the explosives taken in or out, or at least put in, so that the maximum weight of 50 pounds is never exceeded. A regular inventory of such explosives and their weights could also easily answer any potential questions concerning the weights and types of explosives stored in the magazine.

Fireworking Safety, the Law, and You

In general, most hobbyists install some form of a Type 4 storage magazine to comply with these requirements. A Type 4 magazine is a permanent magazine in which “low explosives” (as defined on Page 48) may be stored.

Among common fireworks components and devices, the only things, which cannot be stored legally in a Type 4 magazine, are loose “flash powders” and “bulk salutes.” Bulk salutes are flash devices stored all in one container or box together. If salutes are going to be stored in a Type 4 magazine, they must be mixed in a box with some color shells or similar. Loose flash powder may not be stored in a Type 4, period.

Other than that, a Type 4 is the storage most of us need, even if we are getting a Type 20 license (Manufacturer of High Explosives). In order to comply with CPSC’s requirements, if we explain to ATF why we want that license, and declare that we will not store loose flash powder or bulk-salutes in our Type 4 magazine), then typically the inspectors will tell us that we’re good-to-go with a Type 4.



Remember, any explosives we manufacture and store must be stored in such a compliant magazine, whether or not we get a license.

Page 51 of the Orange book details the various requirements for the construction of Outdoor and Indoor Type 4 magazines.

Much less expensive than magazines made for just that purpose, metal shipping containers are commonly used to make outdoor Type 4 magazines. They can be relatively inexpensively modified to meet the BATFE’s requirements. Page 54 has a table of distances to determine how far an outdoor magazine must be situated from inhabited buildings, highways, railways, and other magazines.

Remember the ATF places limits on the total, maximum weight of explosive material that may be stored in each type of magazine. If one wishes to install/construct an outdoor Type 4 magazine in their area, it’s useful to consult with others in your area who have done so, and with the BATFE to see what their specific recommendations and requirements are.

Many hobbyists install “Indoor” Type 4 magazines to have BATFE compliant storage for their activities. The requirements for these magazines are spelled out on Page 51.

Indoor Type 4 magazines may store a maximum of 50 pounds of actual explosive materials (does not include the weight of the containers, etc.) The magazine must be “*fire-resistant and theft resistant.*” “*No indoor magazine is to be located in a residence or dwelling.*”

An indoor magazine must be in a separate structure—not in a residence or dwelling. It appears that there is no minimum distance it must be separated from the residence of the hobbyist. The separate structure may be a garage or shed near a residence, but it may not be attached to it.

“Indoor magazines are to be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. The walls and floors are to be constructed of, or covered with, a non-sparking material. The doors must be metal or solid wood covered with metal.”

Covering any exposed metal to make it non-sparking can be as simple as painting it with a high-quality paint/coating such as epoxy-appliance-paint or rubberized truck-bed-lining/coating.

“Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.”

“Locks. Each door is to be equipped with (i) two mortise locks; (ii) two padlocks fastened in separate hasps and staples; (iii) a combination of a mortise lock and padlock; (iv) a mortise lock that requires two keys to open; or (v) a three-point lock.”

From Wikipedia: A **mortise lock** is one that requires a pocket—the mortise—to be cut into the door or piece of furniture into which the lock is to be fitted. In most parts of the world, mortise locks are generally found on older buildings constructed before the advent of bored cylindrical locks, but they have recently become more common in commercial and up market residential construction in the United States.



A Mortise Lock

“Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks must be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.”

“Indoor magazines located in secure rooms that are locked as provided in this subparagraph may have each door locked with one steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter, if the door hinges and lock hasps are securely fastened to the magazine.”

So, if I have my indoor magazine in a shed, garage, or other building, which has a door, which locks with two mortise locks, the requirements for the lock on my magazine get drastically simplified.

“*What the Hell??!!*” I can just hear you saying right about now.

“*How can I ever comply with all of this, only half of which I sorta understand?*”

Well, it turns out it can be pretty simple, really.

An extremely simple indoor Type 4 magazine, which will satisfy these requirements, is a good-quality gun-safe, available at gun shops and sporting-goods stores. Make sure the locks meet the above requirements, and that the building is separated from your residence. Use epoxy appliance spray paint to cover any exposed metal on the inside of the magazine. Install some nice

shelving in it. Drill some holes in the bottom and/or back of it to bolt it to the wall and/or floor to make it “theft-resistant.” And, there you have it, presto-chango, BATFE-compliant, Type 4, indoor storage.

Another option, which will come up if you search online for “lockable powder storage container,” is BATFE-compliant black powder storage boxes from sporting-goods outlets such as Cabela’s.

Here’s how you can convert a Ridgid Jobsite Storage Box, from Home Depot, into a legal Type 4 Indoor Storage magazine

How to Make a Legal, Type 4 Indoor Magazine

This is just one approach to creating an Indoor Type 4 magazine, compliant with the BATFE’s requirement that “*all persons who store explosive materials must store them in conformity with the provisions of Subpart K of the regulations*” contained in the Orange Book. (Page 68, Question 72)



Note: Please keep in mind that what follows is my interpretation of the specifications and regulations in the orange book, combined with the advice I have gotten from others. I’m no lawyer or ATF inspector. These regulations are always up to personal interpretation by the individual ATF inspectors in your area.

If you have any questions about the below-listed points, it is best to clarify them with your local ATF office. Review the BATFE’s specifications for “compliant” storage.

Type 4, Indoor magazine:

- Is for storing “Low Explosives.” (no loose flash powder, no bulk salutes, no dynamite) (555.202 (b))
- May not be located in a residence or dwelling. (555.210 (b) Indoor (1))
- May only be used to store up to 50 pounds of explosives. (ditto)
- Need not be any “minimum distance” from residences or road. (555.206 only pertains to “Outdoor Magazines”)
- Is to be fire-resistant and theft resistant. Need not be weather-resistant if the building in which it is stored provides protection from the weather. (555.210 (b) Indoor (1))
- Must be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. The walls and floor are to be constructed of,

Fireworking Safety, the Law, and You

or covered with, a non-sparking material. The door/s must be metal or solid wood covered with metal. (555.210 (b) Indoor (2))

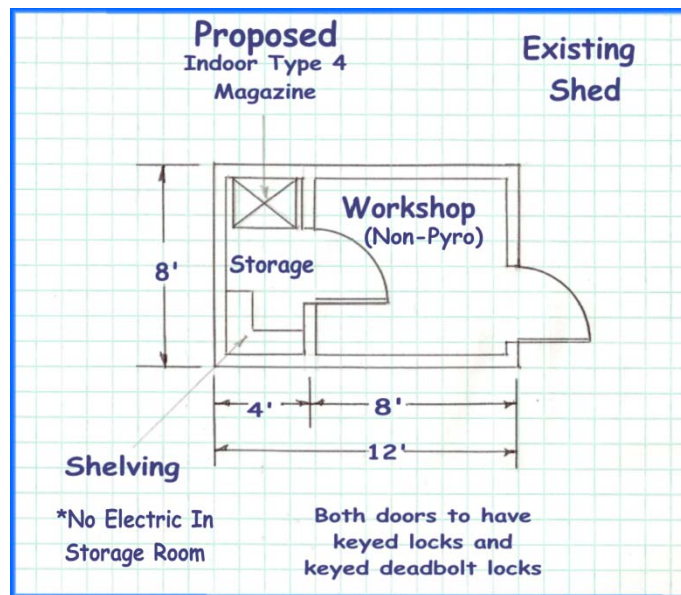
- Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked. (555.210 (b) Indoor (3))
- Each door is to be equipped with (i) two mortise locks; (ii) two padlocks fastened in separate hasps and staples; (iii) a combination of a mortise lock and padlock; (iv) a mortise lock that requires two keys to open; or (v) a three-point lock. (555.210 (b) Indoor (4))
- Padlocks must have at least five tumblers and casehardened shackle of at least 3/8-inch diameter. Padlocks must be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples. (ditto)
- Indoor magazines located in secure rooms that are locked as provided in the above specifications may have each door locked with one steel padlock (which need not be protected by a steel hood) (same lock specs as above) if the door hinges and lock hasp are securely fastened to the magazine. (ditto)
- There is to be no smoking, matches, open flames, or spark-producing devices within any room containing an indoor magazine. (555.212)
- The workspace used to manufacture fireworks must be at least 200 feet away from the magazine. Many hobbyist fireworkers maintain a pyro-shed, or a "work area" as simple as a portable table and tent-shelter, separated from the residence and storage magazine by a minimum of 200 feet.

One Man's Magazine and the Building It Is In

I have a nice shed on my property. It is weatherproof. It is separated from my residence. I can create a "back room" in it, in which there are no spark-producing devices such as light switches, machines, or electrical outlets.

I can install two locks (a keyed entry lock and a deadbolt lock) on each of the doors leading back to the back room: the main entry door and the door to that room.

I can use the "front room" of the shed as a non-pyro workshop, as long as I keep the back room and magazine closed and secured during such operations.



Proposed Shed, Workshop, Back-Room, and Indoor Magazine

So, given all of the above BATFE requirements and specifications, what sort of Type 4 indoor magazine could I put in the back room of my shed?

My pyro-buddy, Gary Smith recently sent me a picture of such a magazine design that he's been working on. It got my "wheels turning."



Gary Smith's Jobsite Storage Box Type 4 Indoor Magazine

Fireworking Safety, the Law, and You

This is simply a Ridgid Jobsite Storage Box, typically used on construction sites for overnight storage of valuable tools and materials. I bought one of these boxes at my local Home Depot.

This box is constructed per the BATFE's specifications, is coated completely with heavy orange paint, making it non-sparking, and is fire-resistant and theft-resistant, especially when it is bolted to the floor or wall. It has two recessed areas for the kind of theft/tamper-resistant locking the BATFE specifies.

For the locks, Home Depot sells No. 17 Padlock Master Locks. They have 1" thick shackles, measured across the "points" of the octagonal cross-section. The shackles are "boron-carbide," and the locks are specified as having stainless-steel rust protection.

The locks are specified on the package as having 1-inch of clearance between the shackle and the body of the lock when the locks are locked. The Ridgid job box instructions specify a Master No 5 lock, which has between 7/8 and 1 inch of such clearance.

So, it looks like these locks meet both the BATFE and Ridgid specifications. I'll keep the lock-package inside the magazine in case a BATFE field inspector ever wants to go over the lock specifications to verify that they do indeed meet his/her interpretation of the agency's requirements.



Master Lock No. 17 Lock

The locks are installed in the job box and held in place with u-bolts and nuts, which come with the box. When the door is closed, and the locks are locked, the body of the locks close around L-shaped bars, which project from the door. When the lock is unlocked, the lock-body slides out further in its little compartment and creates enough space for the L-Bar to slide into. (Trust me, it works just fine.)

When the door is closed and locked, the method of protecting the locks from tampering is as specified by the BATFE, including that the box is to be contained in a securely locked building.



Note: I whacked my projecting bars with a mini-sledge hammer to adjust them, so that the maximum length of the L part of the bars is engaged by the locks when they are locked.



Installation of Lock in Ridgid Jobsite Storage Box

I used a hand-held grinder, crowbar, sledgehammer, and wood block to remove the feet from the “bottom” of the box, which is now to be the “back” of the unit when it is installed as a magazine. Grinding the welds to cut them, and prying/pounding on them eventually got them off of the box.

Fireworking Safety, the Law, and You



Note: I have heard of serious incidents and accidents where someone using a grinding wheel or other grinder to sharpen tools or grind something else, has set off pyrotechnic compounds or fireworks which were stored nearby. Simply put, **Do Not Grind Any Metal Near Pyrotechnics or Fireworks.** Please!



Removing the Feet from a Ridgid Job Box

I then figured out which way I wanted the door to open in the new box configuration. That then determined which end of the box would be the new “bottom” of it.

I used construction adhesive to reattach the feet to the new bottom, and to glue the swinging handle to the box, so that it would stay out of the way during installation. Placing the feet on the new bottom of the box, will keep the box up far enough off the floor to allow the door to swing freely without hitting the floor while opening and closing.

I allowed the glue to set up and dry completely before going on to the next steps.



Gluing Feet onto New Bottom of the Box

I wanted some nice, wood shelves in the magazine, strong enough and far enough apart to support 5-gallon buckets of composition if needed.

I used some $\frac{3}{4}$ -inch-thick plywood, and some 1-inch X 1.5-inch wood scraps to create this shelving. All the wood is simply held in place with good-quality construction adhesive.

I ran a good bead of glue under the back edge of the shelves where they meet the back of the box to support them and prevent them from bowing under weight.

Finally, I installed some wire-mesh “spice racks,” from the shelving department of Home Depot, on the inside of the door to provide some convenient storage for small items like one-pound cans of Goex black powder. These racks were installed so they fit between the wood shelves when the door is closed. The bolt-ends and nuts on the inside of the units were covered with clear caulking to make them non-sparking.



Installing Shelving in Type 4 Indoor Magazine

To install the magazine in the back room of the shed, I drilled four ½-inch holes in the back of the magazine, and used ½-inch lag-bolts and washers to secure the box to the plywood wall.

The heads of the bolts and washers were also covered with clear caulk to ensure they are non-sparking.



Lag-Bolts and Washers Secure Magazine inside the Shed

So, there you have it, one simple option for a legal magazine complying with the BATFE's requirement for safe storage of explosives.

If an individual inspector ever disagrees with any of these design criteria, I'd be willing to explain the reasoning behind my "understandings," and I'd be willing to be further educated on BATFE's requirements and adjust my operation and magazine accordingly.