ARIZONA RESPONSE SYSTEMS

presents

FN FAL AND L1A1 HOME GUNSMITHING

a workbook by T. Mark "Gunplumber" Graham

Revision 010115

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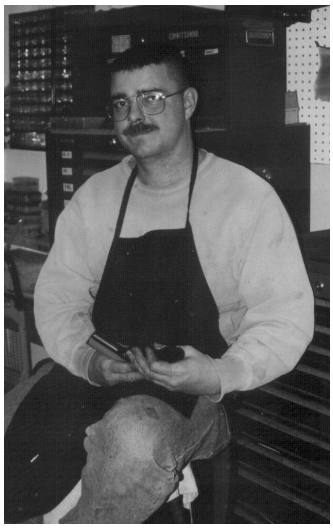
ABOUT GUNPLUMBER
(Revised 09-22-00)



Do you really care about my biographical information? Probably not. On the other hand it helps to establish my credibility - that I really do know what I'm talking about and you won't ruin your FAL if you follow my workbook. I am T. Mark Graham, known on the Internet as "gunplumber." I'm 32 years old, and been tinkering all my life. I am a full-time gunsmith and though this is definitely not the profession to choose if you want to get rich, it is what I love to do and I intend to die happy. I am sometimes called assertive, sometimes an arrogant bastard. Either way, I won't bullshit you.

My parents wouldn't let me have a gun, so I became obsessed – memorizing technical data and reading everything the library had to offer. Went to Military Academy for 8-10 grade and competed (poorly) on the school's indoor small-bore rifle range. I enlisted in the U.S. Army at 17 and served from 1986-1988 with 75th Rangers. Pretty cool training. Unfortunately, I had some completely ignorant, sadistic, knuckle-dragging Neanderthals in my chain of command. Even more unfortunate was the bizarre military tradition that I was supposed to obey them! Square peg, round hole. My smart-ass mouth earned a lot of extra duty, so while others were enjoying themselves by getting drunk and stupid, I had to clean and maintaining the foreign weapons arms room. AKs, AKM/Ss, PKMs, RPKs, RPGs, SVDs, a few MP5SD3s thrown it. Clean 'em all, often. What a punishment. I was in heaven! Learned a lot about function and operation. Waiting for my 18th birthday to buy my first rifle - either a SAR-48 Para ($750) or a Galil ARM ($800) - oh to see those prices again. Met up with an old guy who was a gunsmith for the Army Marksmanship Unit and learned the basics of rifle accurizing and reloading. Inherited an antique Winchester from great-grandfather. Mint. 98% condition. Ruined it. Sold it at 60% condition. Learned a lot of what ***not*** to do. First about the right and wrong tools – screwdrivers in particular. Second – that color case hardening is not rust that needs to be scrubbed off with steel wool. Well – we all start somewhere. . . .

Got out, finished college - A BA in History (Military) from California State University at Fullerton and an MA in National Security Studies (International Relations) from California State University at San Bernardino. The collapse of the Soviet Union dashed my hopes of working in the defense intelligence community. Diploma still gathering dust on my "I Love Me" wall. Taught elementary school for a while, then back on active duty for the SF Medical Course. Shortly after the Gulf War I got to tour military units in Israel and earn the Israeli Parachute Badge. Really beautiful country and a lot of guns – everywhere. Back to teaching. Restoring guns for friends, just for fun. Then started charging a nominal fee for materials. Then actually started to get good. Saw the writing on the wall with regard to California politics and moved to Arizona (Free America), specifically Phoenix - the "Gun Mecca" of the U.S. Built military and police sniper rifles for a famous manufacturer. Gained an enormous amount of hands-on experience on a wide variety of firearms. After a falling out with the owner, I went into business for myself with a few side jobs going until I had a good enough reputation to make it a full-time business. The senior chemist from the same former employer joined me. He knew firearm coatings, and I knew the mechanical side. Thus began Arizona Response Systems and the METACOL (METAl COLor) line of coatings. I still maintained my Army ties through the Reserves, first in counterintelligence, then in chemical warfare. Finally got tired of Clinton's Army and transferred to the Inactive Reserves and became a full-time civilian again in 2000.

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My neighbor had acquired some FAL parts and asked me to assemble it for him. Never done it before, and of course, didn't have the right tools, but he was in no hurry and I was curious, so got that Israeli FALO put together finally and by golly it worked. My FAL experience may have ended there, but I was a proud owner of a Springfield Armory M1A bush rifle. Problem was, it was a piece of crap – was 26" off in elevation at 100 yards (I bought it new). Back to Springfield twice, they changed the barrel, sights and finally receiver, while adamantly insisting there was nothing wrong with it. Finally got it working right, but I'd lost confidence in Springfield Armory in general, and that rifle in particular. I'd already tried the HK 91 and found the excellent quality of manufacture and reliability did not make up for the poor balance, excessive price, and poor ergonomics, so when another friend offered to trade an Entre'prise L1A1 for it, I figured I had nothing to lose. I fell in love with that L1A1.

I guess it was a fortunate coincidence that my new-found passion for FALs occurred at the beginning of what has become a tidal wave of popularity, coinciding with new US manufacture of receivers and inexpensive parts kits. That lead to my rudimentary knowledge of the gun still being more than most knew (in the land of the blind, the one-eyed man is king!), and I've since worked diligently to keep up with some really sharp folks out there asking some tough questions. So while I'll never claim to be an expert, I've been fortunate to maintain a degree of competency that has led to a good reputation in a rapidly growing field. I'm sure you also will fall in love with this brilliant piece of firearm engineering.

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PREFACE

(Revised 11-01-00)

The purpose of this workbook is to assist others in working on FN FAL rifles and their variants. The target audience is the home gunsmith with a low budget, a minimum of tools, and a willingness to jump in with both feet. Writing from Free America (Arizona) I have little knowledge of the rules and regulations in the Occupied Territories. Some of the FAL configurations in this workbook may be forbidden in your area, and in places like the Peoples Republik of Kalifornia, any post 01-01-00 manufacture may be prohibited. Some FAL configurations may conflict with federal rules if performed on post 1989 or post 1994 receivers. I made an attempt in the chapter on laws to address these issues, but it remains your responsibility to verify your compliance.

This project started out of laziness – I got tired of answering the same questions over and over on various FAL related mailing lists on the Internet. So I prepared some standard answers, then a "Frequently Asked Questions" file, and finally this workbook. This is a working document and I constantly revise and update it as I learn new tricks or as the thousands of fellow hobbyists and gunsmiths send me their ideas and experiences. The name of the file is "yymmdd," where "yymmdd" is the date of the last major revision. I identify individual chapters with the last revision as well. Anyone who purchases the shareware version ($10) or printed version ($25 delivered Priority Mail) may download any updated editions free. Both the printed edition and the shareware edition contain the same text, however the printed edition contains exploded view drawings and other graphics which I will not make available in shareware. The printed edition comes in a quality three ring binder for easy update. For the same reason, you will note the workbook pages are not numbered. Download copies are available in .txt format or .pdf file.

Also available from Arizona Response Systems is a companion videotape ($25 delivered Priority Mail). The video is a six hour step by step walk-through of the procedures and techniques outlined in this workbook. The video covers tool selection, barreling, headspacing, timing, custom barrel work, parts comparisons, function testing, and climaxes with a trip to the range to test the assembled StG 58s.

Now for the obligatory warnings. Don't ever forget that you are dealing with a deadly weapon. Your recklessness, carelessness, ignorance, or stupidity can get you or someone else killed. If you have the slightest doubt about your ability to perform the tasks outlined in this workbook, or if there is any question as to the safe operation of your weapon, STOP. Seek the assistance of a competent gunsmith. If you get in over your head, remember that Arizona Response Systems is a full-service firearm refinishing and custom gunsmithing shop. We can probably bail you out. I WILL NOT discuss any aspect of this workbook by voice telephone. Let me reiterate: **DON'T CALL ME FOR HELP IN BUILDING YOUR GUN!** We reserve voice communications for paying customers. You may request assistance by e-mail *(gunplumber@arizonaresponsesystems.com)* - I'll be happy to assist you at my convenience, usually within a day or so. Any comments, typographical errors, recommended improvements, etc. are always welcome, as is your $10 shareware payment.

In earlier drafts of this manual, I tried to maintain some degree of sensitivity and to refrain from commenting on other products – you know . . ."If you can't say something nice, don't say anything." This edition contains detailed reports on my experiences with FAL parts and accessories – both good and bad. Some companies are turning out crap and if they are offended by me identifying their products as such – they should fix their products – not whine about objective evaluations. I only regret that I had to buy the parts to discover how poorly made they are.

If you obtained this document by download, please remember it is not free. It is shareware. This means, if you like it and find it useful, you mail me $10. If you don't like it, you delete it. I DO NOT

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ARIZONA RESPONSE SYSTEMS FAL SERVICES

(Revised 01-15-01)

assemble kit:		$ 150
refinish METACOL IV™ military manganese phosphate "Parkerizing"		$ 150
refinish METACOL III™ Satin Black	$ 185	
shorten barrel and adjust gas port		$ 50
recut Israeli threads to fit inch/metric receivers		$ 25
assembly with military manganese phosphate "Parkerizing"		$ 250
assembly with METACOL III™ Satin Black	$ 325	
headspace only (barrel already mounted, S/H/I extra)		$ 50
supply locking shoulder or breeching washer <.263"		$ 20
rebuild CAI Imbel with DSA parts		P.O.R

assembly includes receiver preparation, shortening barrel (if desired), rethreading and soldering brake, timing, headspacing, matching serial numbers to receiver, testfiring, highlighting lettering, and return UPS Ground with $1000 insurance.

To insure customer satisfaction, we will only work on DSA, or licensed FN receivers and DSA or FSE US fire control parts.

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LESSON 101: TOOL SELECTION
(Revised 01-15-01)

MEN can never have enough tools – must be built into their psyches. A little innovation and careful shopping at yard sales and pawn shops will keep the cost down. Rust doesn't keep a hammer from working and most tools polish out nicely. Most ***MANLY MEN*** have some of these tools on hand already. Some brands have free replacement if you find a broken one and there is nothing wrong with pooling the cost of the specialty tools with friends who are also building FALs. I have included the Brownells part number where applicable. They are definitely not the least expensive, however it is one-stop shopping and their excellent customer service and no-hassle return policy makes them my first choice. Prices are retail. Any law enforcement, government, or gun-related retailer can request dealer pricing and a free 450 page catalog.

Screwdrivers. Use "hollow ground" only. Chapman or Midway is the best value - 20-30 bits with wrench and driver handle for $30. Brownells also makes an excellent basic set (part #080-101-801, $37) and several expansion sets set for the more discriminating user . Get the "Police Armorer" short handle and the "clip-tip" (part #080-088-001, $8) instead of the magnetic tip – magnetized tips don't release the part you are trying to push into place. Tapered screwdriver blades that you find at most hardware stores ruin guns. The screw slot is squared. Put a tapered screwdriver into the slot and it only puts torque on the top edges of the slot. I know you've seen grip screws with hour-glass shaped swages taken out of them. That's why. This is the one tool you CANNOT avoid without dire consequences. A hollow ground screwdriver allows you to put force on all parts of the screw slot evenly. Select a driver that is as wide as the slot.

Files. ($6-$12 each) A 12" and a 6" mill file, sharp with one edge ground smooth or "safe" is best. Select one thin enough to fit inside the receiver where the bolt-carrier slides. Also 6" triangular file, one side ground smooth. When grinding a safe edge, use a belt sander with a hard backing. Quench the file constantly. If the file ever turns red during grinding, throw it away as you have ruined the temper and it will never hold an edge again. Nicholson makes some inexpensive handles that are nice.

Belt Sander. (from $70). A real time saver. Not necessary, but will speed things up. This and your grinding wheel are the "poor-man's lathe"

Grinding Wheel (from $45), as fine as possible, may have to true to get a sharp, 90 degree edge. Must have a rest on the grinder. Often the belt sander and grinding wheel can be had on the same machine.

Rotary Tool. (Dremel, et. al. from $55) Not totally necessary, but well worth the modest price. If you are feeling wealthy, a flexible shaft is very nice.

Standard Punch Set. Buy Craftsman from Sears ($25). They are more expensive than other brands, but you WILL break them and they are replaced free. Used for driving pins. My 1/16" punch cost $4.99 and I have replaced it at least 40 times in the last 10 years.

Small Hammer. A framing hammer is too big. You need control. You must be able to comfortably swing it with wrist action only while seated. A brass one is best. If you use a steel one, belt-sand the face perfectly flat; they are usually slightly convex. The Brownells 1"nylon/brass is a good value and you can purchase replacement nylon, brass, or steel heads, but avoid the plastic (part #818-600-100, $15).

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Hockey Puck. ($7). This is your bench block - the tool you will use most. Drill a ½" hole in the center. Drill a ¼" hole somewhere else in it. Drill another ½" hole (or cut it) overlapping the edge. Cut a ½" groove across the diameter of the puck to about 1/3 of the depth of the puck. You can now hammer pins from any angle without marring your gun or the work surface.

StG-58 Carry Handle Tool. These two simple tools ease the removal and reinstallation of the c-clips on the StG58 carry handle. The one on the left is for pressing the plastic handle down to expose the close-loop c-ring. You can also use partially opened pliers and rap on them to press the plastic down. The ring can then be pried off. The handle must be removed for hot refinishing as it melts around 225 degrees F. Reinstallation is done with a tool made from a cutoff section of a .22 barrel with a crown no deeper than the thickness of the c-ring, and wide enough for the c-ring in its expanded position, will set the ring in a more secure manner. Magnetizing the tool (or a small drop of grease) will hold the c-ring in place while you invert it over the handle shank. The tools that I made are set into Brownells screw driver handles.

Pistol Grip Wrench. Construction time, including some trial and error, less than an hour.

1. 3/8" T-handle drive. Craftsman is $12
2. 9/16" deep socket, 12 point. Craftsman is $4
3. scrap piece of flat metal

Cut a piece of scrap metal (your screwdriver bit) to just a bit longer than the outside diameter of the 9/16" deep socket. The width of the scrap metal should exactly match the width of the slot in your pistol grip nut. The height is important only relative to the height of the slot you cut in the socket. Using a rotary-tool cut-off wheel or a bimetal hacksaw, slot the socket so when inserted, the bit is recessed in the socket the thickness of the rim on the pistol grip retaining nut. Peen or stake to flair the ends of the bit, so it does not slip out. Alternatively, retain with a piece of masking tape. The bit centers in the pistol grip retaining nut slot, while the socket supporting the outside of the nut and keeps the bit from slipping. You can apply great pressure to turning the nut without gouging or climbing out of the slot The bit can be surface hardened with Casenite or similar compound. The bit must be secured in the socket and not extend too far past the diameter of the socket, or it may slip and gouge the inside of the grip. For Israeli grips, where the bolt partially protrudes from the nut, file a small clearance notch in the center of the bit. Preferably with a round chainsaw file, as the sharp corners of a flat file cut will contribute to bending your bit under high torque pressure.

Rubber Mat. (from $10) You can buy a "gunsmithing" one, but a regular automotive type floor mat works great, is larger, and costs much less. Select one as smooth as possible on both sides - none of those carpet-gripper types. This protects your work surface and your work from scratches. A section of flat, dense, outdoor carpet will work well also.

Towel. White cloth towel over your floor mat helps you find your parts. Regular paper towels are fine too. Blue shop towels do not shed lint as the white ones do.

Light. You can never have enough! A good 100 or 150 watt swinging light is best.

Stereo Speaker. For those who don't have a garage or shop and are working over a shag carpet – the large magnet is great for finding those little pins you lost. On the subject of lost parts – there are two

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kinds of gunsmiths: those who have crawled around the floor for hours looking for parts . . . and liars.

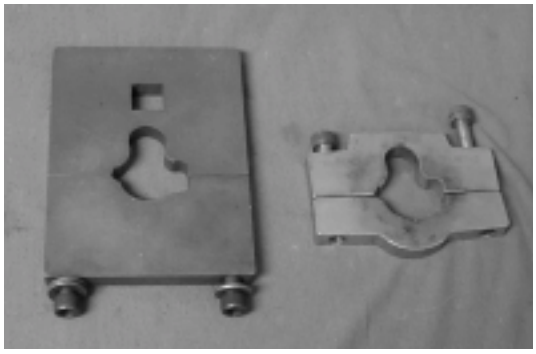
Safety Glasses. ($5 and up) I am not going to baby you with safety precautions. Use common sense. You WILL have springs hit you in the eye eventually. Want to gamble on when?

Calipers. ($30 and up) Plastic reloading calipers are probably accurate enough for most work. Have an inch to millimeter conversion chart or a calculator. A micrometer will work also, of course, if you know how to use one.

Vise. Bigger is better. Minimum 4" Replace jaws with aluminum or hard wood slabs. Can be rubber-banded over steel jaws. Thick leather will work in a pinch. Brass or aluminum blocks cut with semi-circular grooves is a great assist in holding a barrel tightly. Needs to be bolted to the bench. After breaking three $60 5" Chinese ones, I finally bought a $350 American made Wilton, but for a hobbyist, the cheaper imports are fine.

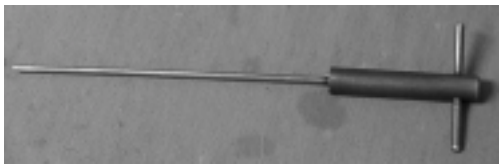
Lapping Compound. Final fitting and smoothing of close-tolerance parts. While there are several brands, I like JB Bore cleaner sold through Brownells (part #083-065-002, $6).

Receiver Wrench. You can make your own for one-time use by taking a wooden block and tracing the outline of the receiver face. Cut in half and it will hold your receiver in a vice tight enough for torquing the barrel. Casey Elliot Enterprises makes a nice FAL one ($70?), with a few annoying features, as does the American Gunsmithing Institute ($65?). You can also shim a receiver in a vice if you support by an installed bolt-carrier and cocking handle to prevent crushing.



Dies. ($35) 9/16"x 24 tpi RH (most L1A1 flash suppressors and muzzle brakes). 9/16"x 24 tpi LH (most metric flash suppressors and muzzle brakes) or 14mm x 1.0 LH (AK-47 flash suppressors and muzzle brakes). Brownells finally has the latter at a reasonable price (part #246-100-000, $45). 14mm x 1.0 LH is close enough to 9/16 x 24 LH for most uses. A 15mm x 1.0 RH (HK flash suppressors and muzzle brakes) is also an option. A 1"x 16 tpi RH is used for rethreading Israeli barrels to L1A1 and Metric barrel standards. Prices are $35-$60. I usually say never skimp on quality when buying tools because you'll have them for life, but even cheap dies, kept cool, will last 5-10 barrels. Best to have one end of die tapered and one end flat. This way, you won't have to cut a shoulder (some come tapered both ends). One guy can buy the die and "rent it" to others to reduce cost. Dies that are hex shaped are for chasing or cleaning already cut threads. The round split dies are for cutting new threads. The differences are in the cutting angle and important only in production work. The round ones require special T-handles, the hex can be turned with an appropriate size wrench.

But Stock Tool. Definitely a good thing to have. Makes removal of the recoil spring cap easy. About $15 from TAPCO.



Torch. MAPP Gas is the way to go. Or Oxygen - Acetylene if you have it. Propane just doesn't get hot enough for high-temperature silver soldering. Complete Benzo-Matic MAPP setup available at most Home Depot/Home Base type stores ($25).

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Headspace Gauge. The .308 "GO" gauge is mandatory. A "GO" and a "NOGO" is preferred ($24 each from Brownells part #513-100-260 and #513-100-261). Also available for about $20 from Midway and Bushmaster/Quality Parts.

Front sight Tool. Nice to have in the range bag, but a cheaper substitution is a pair of straight snap-ring pliers.

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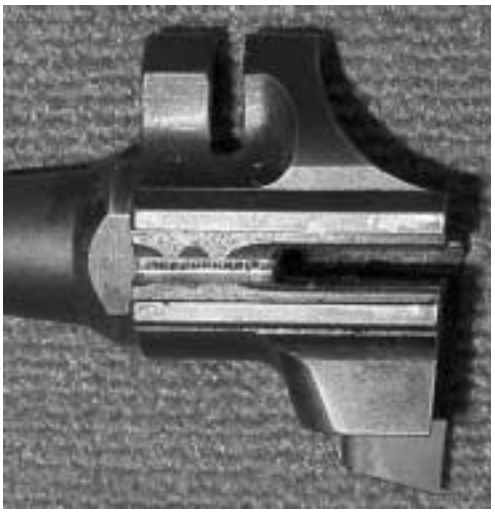
LESSON 201: REMOVING AND INSTALLING THE BARREL
(Revised 01-15-01)

To install a barrel on your receiver, you may first have to remove the old barrel, or in the case of some kits, such as the StG-58, you may have to remove the remnants of a demilitarized receiver from your new barrel. There is not enough receiver stub to lock up well either in a bench vise or a barrel wrench. Do not mess with it. You may be enthralled with fondling a small piece of history for a while, but it wears off quickly. These Austrian barrels are on VERY tight and but can be cut off easily.

Secure the barrel in the vise with the left side of the receiver facing up. Take a small sharpened punch and prick the breech through the slot where the cocking handle goes. Make sure your tiny mark is exactly centered in the slot. This "witness mark" will assist you in getting the barrel aligned in your new receiver. Get yourself a hacksaw with a bimetal blade, teeth pointing toward you so they cut on the pull stroke for greater control. You will notice a dimple inside the cocking slide channel. This is the thinnest part of the receiver. Take the hacksaw and cut parallel to the slot right on top of this. You can use a cut-off wheel on a rotary tool as well, being careful not to let the wheel bind and then skip out of the slot and into your finger. Feeling in your jaw, the vibration of a cutting wheel grinding to a halt in your knuckle, is unpleasant. I know this. For doing assembly-line receiver stub removal, I use a reciprocating saw with a short and fine DeWalt blade. It works just like the hacksaw method, but is very easy to screw up and I don't recommend it for the novice.



You should cut until you see a slight change of color -- you'll see the tops of the barrel threads poking through. Even out your groove, being careful not to gouge the barrel when you are working at the front end of the receiver. When you finish, move the blade inside the cocking slide channel and cut toward the chamber, cutting all the way through the receiver. Stop when you are a few thousandths of an inch short of touching the breech face. Take a cold chisel (not a woodcarving one) and stick it between the top and bottom part of the cocking slide channel and smash it with a hammer. A few vigorous blows will split the receiver right along the groove you have cut and the receiver will spin off the barrel by hand. If you cut too deeply and actually cut into the threading, don't worry, just polish out the gouge – it doesn't show and won't hurt the barrel.

To remove a barrel from an intact receiver, secure it in the vise. Either use a correct receiver fixture, fabricate a block from wood, or shim. More on this later. Do not have any part of the vise jaws touching the receiver where it joins the barrel. You should have nothing on the barrel except the front sight assembly and handguard retainers. Remove the carrying handle and gas tube.

If you are going to discard the old barrel you may use a pipe wrench with a 12" or longer handle. Remember, pipe wrench only grips in one direction. Grab the barrel with the wrench as close to the receiver as possible. You can gain significant mechanical advantage by adding a hollow pipe ("cheater bar") to the end of the wrench, extending its length. Sometimes a hard rap with a hammer will free a barrel easier than steady force. Applying heat from a MAPP Gas torch will melt any dried grease that may be gluing the threads tight. Keep the flame moving around the joint. Under no circumstances should you use anything but air to cool it off afterwards. Quenching will make the metal more brittle. After the oil has burned away and any smoking stops, you should have slight

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discoloration at the joint. Shut the torch off and repeat the steps above. If the barrel still does not move, you are stuck and will have to find someone to do it right, using a hydraulic barrel vise and a form-fitting receiver wrench.

To avoid marring the barrel, you must use a fitted wrench on the flats in front of the receiver face. 1-1/16" and 27mm are pretty close and can be filed to an exact fit. Ideally, it will be so tight you actually have to tap it with a small hammer to get it on the flats. A poorly fitting wrench will slip and round out the flats. In most cases, a crescent wrench is too loose. If you insist on using one anyway, select the largest you can find - 12" or longer handle. Tighten the crescent wrench around the barrel flats. Then remove the wrench and tighten it a tiny bit more. Then tap it on. You can also file the barrel flats to fit whatever size wrench you have. Although still marring the barrel, it is not as unsightly as gouges from pipe wrench jaws. Follow the same heating procedures, if necessary. After the barrel is off, clean the crud from the barrel threads and degrease it.

Make sure you have the handguard retaining ring (socket, rear handguard) on first. Can't count the number of times I did a perfect barreling job, then noticed the retaining ring still sitting on the bench. You can pull the front sight on inch/metric to install from the front, but you must pull the barrel again to install the Israeli heavy barrel. All receiver rings are not the same size. Test fit first. The Israeli FALO is different from the standard metric, and Commonwealth and Belgium styles vary slightly. Spin the barrel on and note where it stops.

Ideally, you will fabricate a receiver wrench such as the ones shown, or following the plans included in the schematics section of this workbook. If you are putting the receiver in a vise, have the stripped bolt carrier (slide assembly) and cocking handle slide in place so you don't pinch the rails. Two bolt carriers, the front one a paratrooper or standard with rat-tail removed is better. The barrel should end at 11'oclock. If it doesn't do the following:

> GENERAL. I never was particularly good at math, but there are some calculations that may put into perspective what we are doing when timing a barrel. There are 360 degrees in a circle. There are 12 points to a clock, therefore the distance between 11 o'clock and 12 o'clock is 30 degrees. Your barrel is 1" in diameter and threaded at a pitch of 16 threads per inch. The distance peak to peak on each thread is 1/16 inch, or .0625". Therefore each complete rotation of the barrel moves it .0625" closer to the receiver. When the barrel shoulder is flush against the receiver and torqued down, but the front sight is not pointing directly up at 12 o'clock, then the barrel is "out of time" either too short or too far. You change the timing by removing (or adding) material to the shoulder. Since .0625" is one complete revolution, each degree of timing is approximately .0002" of shoulder material, and each clock position (30 degrees) is approximately .005". At approximately 100 foot pounds of pressure, the barrel will turn a bit less than 30 degrees past the point where it stops under hand pressure. The barrel should hand tighten to approximately the position shown in the photo below. A one degree error manifest as approximately 3" off at 100 yards.
>
> INCH PATTERN. Select an appropriate sized breeching washer from your extensive supply *or* go to hardware store and purchase a few steel washers with a 1" inner diameter. Steel shim stock can also be used. If thin enough, you can cut with shears. Sand or grind the outside diameter of the washer to 1.25" or about 31mm. Then flat sand washer until barrel will stop a bit past 11 o'clock, between 15 and 30 degrees short of top dead center. Change the direction of sanding frequently and do both sides to keep it flat and parallel (who needs a surface grinder!). If your wrench turns the barrel past 12 o'clock, then start over testing the fit more frequently. If not far enough, keep sanding.

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METRIC. Use your 12" mill file with the safe edge against the barrel threads. It is easier to keep a long file perpendicular than a short one. Files cut only on the forward stroke. Cut shoulder in four directions, making a square around the round barrel. Then file four more cuts to make an octagon. Take it slow. A good, sharp, file can remove .0005"-.0010" per pass and you will want to test fit each .001" inch. Use a magic marker (poor man's Dykem layout fluid) to color the area you have cut. Screw the barrel on. Areas where the magic marker has been scratched are your high points. File these high points flat. Cut again offset from your first 8 cuts. Its better to angle the outside edge of the file about 1 degree up then to angle it down, although perfectly flat of course is the goal. Repeat until barrel spins on to correct point. If you remove too much metal, all is not lost. Using your brass hammer (or very gently with a steel one) tap the shoulder all the way around, swaging the metal out. A hundred moderate strikes are better than pounding on it. You can cheat here and shim it like an inch gun, if you desire, but swaging will work fine.

Of course, if you have access to a lathe, the best way is to spin the barrel and shave .0005" to .0010" at a time, test fitting until it indexes as described.

Unscrew the barrel and select the appropriate wrench. Screw the barrel in, and "crunch" the barrel (100 foot pound minimum is ideal) the rest of the way so the front sight is at 12 o'clock top dead center. You can use the gas cylinder and gas cylinder bush/rear support for gross alignment and your tiny witness mark inside the cocking handle channel will help as well. Without the carrying handle, it should screw into receiver without binding. If you have an StG-58 with the short brazed gas cylinder you insert the gas piston and insure it moves freely. Final alignment is verified by attaching the lower receiver assembly and sighting in on a light colored surface. You can use a cheater bar for additional leverage. I have found pulling upward on the wrench gives more control than pushing downward. Some recommend clamping the barrel and turning the receiver with a receiver wrench - but if you're not willing to pay to have someone else barrel the gun, we can assume you don't want to buy a barrel press either.

Also – turning the receiver makes it harder to see where top dead center is. If it won't turn far enough, unscrew and take more material off the shoulder. If it goes too far, remove the barrel, degrease, and peen the shoulder with a hammer all the way around. Screwing the old receiver stub part way on will give some protection to the threads if you miss with the hammer.

You will have to choose whether to use anti-seize compound on your threads or to use a thread locker or nothing at all. Anti-seize will allow you to turn the barrel a few degrees further under the same pressure, as it keeps the metal from binding or "galling." Thread locker is useful on Israeli barrels where the threads are recut and don't match perfectly with the receiver. Thread locker also is added security if your torque level is less than 100 foot pounds (such as a barrel on the verge of timing too far) and also makes tampering evident, as it requires heating to 300 degrees to melt the red or green type.

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LESSON 202:
CONVERTING AN ISRAELI BARREL TO STANDARD THREAD PITCH
(Revised 09-22-00)

Lock barrel in vise jaws (not holding by gas block). Leading with the tapered side, a 1" x 16 tpi die should spin 50-60% of the way on without tension. Continue tightening, using cutting fluid (Tapmatic, Du-Rite, etc) or lubricating oil. Goal is to keep work cool and keep chips clear. Go slow, backing die out often to clear chips. Die should never become too hot to hold in your hand. On a side note, you can use valve lapping compound and a lot of working back and forth to lap the barrel and receiver together, but consider this mating as permanent, because both barrel and receiver are now halfway between Metric/Inch and Israel.

> ***Note.** *The Term "Inch Pattern" refers to the L1A1. That is Australian, British, Canadian, and Indian (although Indian parts vary slightly). The term "Inch Pattern" however is a bit misleading when compared to metric, because both Inch and Metric guns are built to the English thread pitch and are mostly interchangeable with metric. It is more a general term for the system of the country of origin, and perhaps "Commonwealth Pattern" and "Belgium Pattern" would be more accurate. Israeli is different only in the barrel thread, and front sight thread. Some Argentine guns also use the non-standard Israeli front-sight thread pitch.*

After the die is all the way up to the shoulder, unscrew and repeat, leading with the flat side of the die. This should cut the last few threads a bit more and will take the recut threads all the way to the shoulder. Some dies are tapered on both sides. If this is the case, you will have to use more strength to tighten the last few turns when barreling. Lathe turn the barrel and skim any high points from the torque shoulder, being careful not to reduce the shoulder. Brake the 90 degree edge. If not using a lathe, lightly file and sand any burs from the edge of the shoulder, being careful to keep it squared. Then, by rotating the barrel 45 degrees against a sanding block, (fine - 180 grit or less) Break the sharp 90 degree edge just to the point where it won't cut you.

The barrel is now ready to install on your receiver - sometimes. Some barrels (mostly Israeli) have a peculiarity. Screw it all the way into the receiver and it stops - not on the shoulder against the receiver face, but on the breech face against the rails/feedramp. Lathe turn with a steady rest or flat file the breech face, continually changing direction of cut by rotating barrel to keep it perpendicular. It's okay to have a tiny gap between the breech face and the rails/feedramp. One source even suggests that a .020" gap is beneficial to accuracy, although I have been unable to verify this. If your file starts squeaking and squealing, the metal is too hard and you are wasting your time with a file. You'll have to use a sanding block and 120 grit emery paper. You can also rotate the barrel against the hard backing of a belt sander if you are careful to keep the part cool and square. You should rotate at least a 1/4 turn each time. Just touch it lightly to the belt - go slow. Check fit several times until it is the shoulder, not the breech face that stops on the receiver. Then polish throat down to 600 grit. Finish with felt polishing wheel and white compound, if desired.

Another point of consideration with rethreading an Israeli barrel is that the new threads need to seat themselves to the threads on the receiver - they are a bit thinner and sharper now than they were originally. You want to make sure any "seating" is done before final torquing of barrel. So before adjusting the barrel shoulder, tighten the barrel on hard, then unscrew. Repeat this two or three more times. Now any irregularities in the new threads have been seated to the receiver threads. You may now adjust the shoulder and do your final torquing to top dead center.

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LESSON 203: SETTING THE HEADSPACE
(Revised 09-01-99)

WHAT IS HEADSPACE?

Headspace is the distance between the front of the bolt face and the back of the brass casing when the casing is as far forward in the chamber as it can go. When the round fires, the chambered casing moves backwards until stopped by the bolt face. The chamber and the bolt enclose the casing during firing and contain the massive pressures from the burning propellant. If the headspace is over the "safe" range, these pressures are not adequately contained and catastrophic failure may result. If the headspace is under the safe range, the chambered round swages into the throat, increasing pressures dramatically. The round could also fail to chamber, and a round with a high primer may fire before the bolt locks.

The way you measure headspace depends on the caliber. You measure rimless rounds from the back of the case to the case mouth. Use the belt on belted magnum cartridges. You measure center-fire cartridges that have shoulders from the back to a specified point on the shoulder. In the case of .308 Winchester, it is the point on the shoulder where the diameter is 0.400." You *can* get by without headspace gauges, although this is one area where you may not want to take short-cuts.

The three gauges are called GO (1.630”), NO GO (1.634”), and FIELD (1.638”). A GO gauge is the minimum chamber dimension. The NO GO gauge is the maximum chamber dimension. A FIELD gauge is the "super maximum" or the point where it is totally unsafe to fire the weapon even under combat conditions. Dimensions are measured from the rear of the gauge to the point on the shoulder where the diameter is .400” Many rifles with NO GO readings can still be safely fired, but one would not leave the arsenal in that condition. With respect to FALs, we are in luck. The allowable variance in headspace is much greater than in other rifles.

HOW DO I CHECK HEADSPACE?

Most rifle bolts have lugs on the front that rotate or cam into place, thereby "locking" the bolt. The FAL is different in that the bolt does not rotate, but instead moves forward and cams down into lock. The locking surfaces are not rotary lugs, but the lug on the bottom rear of the bolt. This engages a part in the receiver called a locking shoulder. The locking shoulder is that cross piece that sits on top of the part that holds the magazine catch, bolt hold-open, and ejector. It is called the ejector block.

The proper way to set headspace on a FAL involves putting a GO headspace gauge in the chamber, inserting a specially calibrated tapered rod in the locking shoulder hole, and pushing the stripped bolt and bolt slide closed. Read the number point on the tapered rod that just allows the bolt to close and select a correspondingly sized locking shoulder from your vast inventory.

There are 16+ sizes of locking shoulder, but you have to make do with the one that came with your kit. I have found that locking shoulders measuring .262" are the largest commonly needed and can be ground to size. Strip the extractor and firing pin assembly leaving just the bolt in the bolt carrier. Install your GO gauge in the chamber. Gently push the bolt carrier forward. It should close completely. If not you have "short" headspace, then take your NO GO gauge and repeat this step. The bolt should not close, even with slight pressure (don't slam it). If a GO gauge closes and a NO GO does not, your rifle is properly headspaced. Mark the bolt and bolt carrier with the rifle serial number. If you plan on having a spare bolt or carrier, verify these as well and mark with the rifle serial number. Bolts and bolt carriers are NOT always interchangeable.

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You don't want to buy a gauge? You really should. Get a factory loaded Federal 168g or 173g National Match .308 cartridge or unfired brass. This is your GO gauge. Cut a disk of masking tape or a feeler gauge that fits over the base of the cartridge. The case plus tape is your NOGO gauge (that's right -- the thickness of a piece of tape is the only variance allowed). You must not use anything but National Match ammunition. Typical military 7.62x51mm is slightly undersize for reliable feeding in belt-fed machine-guns that can handle the variances.

WHAT IS SAFE FOR MY FAL?

A .308 headspace dimensions are 1.630" minimum (GO) and 1.634" maximum (NO GO). The difference is .004" which creates a problem. The FAL must have interchangeable parts. The weapon needs to be factory assembled without hand-fitting parts. The locking shoulder moves slightly ("setback") during initial firing. These variations are cumulative. The amount of tolerance needed follows.

Interchangeability of parts	0.0045"
Headspacing	0.0010"
Locking shoulder set back (.0007 to .0022)	0.0015"

Factory tolerance	0.0070"
Field wear tolerance	0.0015"

Total headspace	0.0085"

Tolerances are the sum total of the maximum error in each of seven categories. I doubt any weapon would display maximum variance in each category, but it is theoretically possible. Our acceptable variance is now 0.0085." This is far greater than the .0040" variances of our gauge. Because of this, the Rifle Steering Committee ordered extensive evaluation of tolerance variations and safe operating dimensions and came to the following conclusions.

"A" dimension is from the .400 point on the cartridge shoulder to the bolt face (headspace). "B" is from the .400 datum to the locking shoulder face.

U. S. GO and NOGO gauge	A 1.6300" to 1.6340"	(.0040")
Factory new rifle, test fired	A 1.6315" to 1.6385"	(.0070")
	B 5.4475" to 5.4500"	
Rifle in Service	A 1.6315" to 1.6400"	(.0085")
	B 5.4475" to 5.4515"	

Given the predictable wear of parts and the locking shoulder set back, I like to headspace all barrels to .001" under where I want to end up, which is .002" over minimum, or half way between a GO and a NO GO. I do not recommend setting for minimum headspace. I find the popular press extolled virtues of a "minimum" headspace to be highly overrated, and the increased reliability of slightly looser headspace to be valuable, considering the wide range of quality in the available surplus ammunition market. Consider this. The Gunwriter-Whores* say selecting a service rifle with minimum headspace is a good thing. But what chamber reamer cuts the smallest chamber? That's right – the oldest, most worn one. So a new razor sharp reamer will cut a perfect chamber, and a dull, worn-out reamer will cut a sloppy chamber, perhaps with chatter marks and scoring, but it will be "tighter." I'm not impressed. By the way – my "loose chamber" philosophy is for service grade autoloaders, not precision bolt guns or rifles restricted to special ammunition.

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**A "Gunwriter Whore" is someone who writes glowing reviews of every free gun he gets, to insure he gets more and to insure the manufacturers continue to spend big bucks on advertising in their magazines. Every gun reviewed is the best he's ever seen. Gunwriter Whores use terms such as "new gun syndrome" to rationalize favorable reviews on guns that won't function out-of-the-box and they try to convince their readers that every gun should require several hundred rounds of "breaking-in" or tuning by a master gunsmith before it can be expected to perform its basic function of going "BANG!" every time the trigger is pressed.*

Typical 3M brand masking tape is 0.005" in thickness. Therefore, if your bolt closes on a NOGO gauge (1.6340"), you are still okay. If it closes on a NOGO plus a piece of masking tape (1.6390"), you are unsafe (FIELD is 1.638"). If it closes on your field-expedient gauge made with a National Match Cartridge (we are assuming a National Match case is the 1.6300" GO minimum) and a piece of tape (approximately 1.635"), then you are okay, just on the long side of acceptable. Two pieces of tape (approximately 1.640") are unsafe. Remember that these measurements are for the FAL only and do not apply to other rifles.

HOW DO I FIX SHORT HEADSPACE?

Short headspace is usually characterized by difficulty chambering. If you have a .308 finishing reamer and a non-chrome-lined barrel, you can cut the chamber deeper until you reach the proper dimensions. You can also remove material from the bolt locking surface, however I do not recommend this because it precludes you from using a different bolt. The best way is to get a proper sized locking shoulder.

Remove the locking shoulder with a #7 (7/32") roll pin punch. Using a flat head punch invites slipping and scratching the receiver. You may be able to file the locking surface, but in all but the hardest files, the metal will be too hard. Use the edge of a thin sharpening stone or 220 grit sandpaper to remove material from the face of the locking shoulder. Follow the original angle and remember that you are removing less than the thickness of a piece of masking tape between test fits. The edge between the top of the locking shoulder and the face must be beveled, so if you remove enough material to make this edge sharp again, sand it back down. Reinstall the locking shoulder using a brass hammer or your pin punch. Insure you align the oval tab with its recess. The slightest misalignment will make this brittle tab break. You can turn it with a wrench to align it prior to seating it in place.

This method may require removing, fitting and reinstalling the locking shoulder several times. A way to get it right the first time is to go to a machinery supply store and purchase steel dowel pins. They come in .0005" increments on the expensive ones and .001" on the cheap ones. They are about $4 each and you can get away with every other pin if you don't want to buy the whole set. Figure you will need .256" to .264." Insert the dowel in the locking shoulder hole with a GO headspace gauge in the chamber. Find the pin that just barely allows the bolt to close. Hone your locking shoulder to the same dimension.

HOW DO I FIX EXCESS HEADSPACE?

Excess headspace means upon firing, the web of the cartridge case is not supported by the chamber, This causes the brass to expand at the web, which weakens it. Extraction can then result in the base of the case being ripped off. You can fix by finding a bolt and bolt carrier combination that fits, but you will probably need to purchase a new locking shoulder. I have found that locking shoulders measuring 0.262" to the locking face are large enough for most guns. Take this new locking shoulder and follow the directions for short headspace rifles.

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If your bolt will not drop into place, but will close with moderate pressure, you may not want to risk breaking the locking shoulder by removing it again. Apply liberal amounts of lapping compound to the bolt locking surface and the locking shoulder, and with a case in the chamber (no extractor) slam the bolt home repeatedly. Note that I wrote "a case" and ***not*** "a live round." Do not use your gauge.

Go to the range and fire your completely assembled single shot rifle with liberal amounts of lapping compound and with the gas at the lowest setting (0 or 1) until the parts lap into place and make it a self-loader again. Usually 10 - 20 rounds. Use only U.S. factory ammo for this "shooting in.". A high primer on a reloaded round, in conjunction with short headspace, can cause it to fire before it is fully chambered (out-of-battery) with catastrophic results. Do not fire unless the bolt closes all the way. Usually, the force of the bolt snapping forward from its fully retracted position is enough, while the cycling action of a fired round is not. If a fired case sticks in the chamber, do not stomp on the cocking slide handle. Hold the handle and slam the butt of the rifle on the ground.

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LESSON 204: CUTTING AND THREADING THE BARRELS

(Revised 09-22-00)

The purpose of this lesson is not to lecture on what is or is not legal under the various Gun Control Acts. It is your responsibility to comply with all applicable rules created by the tax collectors at ATF. The text of relevant laws is in a different section. It is unlawful to have a "barrel threaded to accept a flash suppressor" on a post 1994 rifle, and is illegal to have a barrel shorter than 16" without ATF registration and approval ($200 tax).

CUTTING A BARREL

The easiest way to cut a barrel is with a chop saw. This method takes about ten seconds. A hacksaw takes longer, but is less expensive. Then you can hand file the end of the barrel flat, or you can rotate it against a belt-sander to get a smooth surface. Finish with 600 grit, if desired. If you are installing a muzzle control device or a (gasp!) flash hider, there is no reason to crown it. If you are going to leave it exposed, it is a good idea to protect the rifling. Take an RCBS case neck reamer and use it to deburr the inside. It leaves about a 45 degree crown. You can put this in a three-jaw chuck in a power drill and cut a deep crown. Brownells also sells a set of piloted cutters for hand-crowning. You may cut a barrel that is attached to a receiver to 16". Measure barrel length from the end of the barrel, through the bore, to the bolt face with the action closed. A permanently attached muzzle control device / flash hider is included in the overall length Therefore, If you are permanently attaching such a device, you may cut the barrel shorter than 16" so long as the permanently attached muzzle device brings your overall length to > 16". You may not, however, cut the barrel to < 16" when the barrel is attached to the receiver, because you would then have, even for a short time, an unregistered short-barreled rifle.

THREADING A METRIC BARREL

Take your barrel and wrap a piece of masking tape ½" from the end of the barrel. Take your bench grinder. Insure the edge is 90 degrees. If not, true the wheel in as with your owner's manual. Take the shelf that is in front of the wheel and slide it in as far as it will go toward the wheel, without touching. Having too large a gap between the wheel and your shelf can allow the wheel to grab the barrel and hold it while merrily grinding away.

You need to reduce this shank to 9/16” (.551") so scribe a .551" circle on the front of your barrel so you will know how much metal to remove. There are two ways to do it on your "poor-man's lathe". First is by cutting flats. Mark eight equally spaced spots around the barrel. Cut each one flat on the grinder, making an octagon barrel. Once again, keep it quenched. It should never change color or become too hot to touch. Quench after every cut. Then cut eight more flats on each of the eight points on the octagon. Repeat as necessary to get your diameter down to almost .551" Finish by rounding your 16 points with a hand file, using the sharp edge of your file to cut the shoulder to a sharp 90 degrees. The second way is quicker, but involves a bit more coordination. Lightly hold your barrel against the grinding wheel while turning it rapidly until you have reduced the outer diameter to .551". Finish with a hand file as with the first method.

You must now turn the outer diameter of your barrel to 15mm (15.08mm / .594" to be exact) Check it first, if its an StG, it probably is there already. You can do it by having a step from 15.31mm to 15.08mm, or in the case of short barreled guns, it's easier to start at the front sight and do the whole barrel forward of the front sight. Mark the barrel with tape 66mm from the end of the muzzle and turn if against the belt sander (with hard backing) and a very fine grit belt. You are not removing much material. Finish by "shoe-shining" with emery paper. Slide your muzzle device over and see if it sleeve fits tightly. A slight air gap won't hurt, but looks tacky.

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Now it is time to thread the barrel. Lock barrel up in vise jaws. Leading with the tapered side of the die (9/16 x 24 tpi LH or 14mm x 1.0 LH for metric or AK brakes, 9/16" x 24 tpi RH for Inch Pattern), insure your die is perpendicular to the barrel. Ideally, you will have the barrel held vertically in the jaws to assist in getting it perpendicular. A large handle on the die works better than a wrench because it is easier to keep straight. Continue cutting using cutting fluid or oil. Your goal is to keep the work cool and to keep chips clear. Go slowly, backing die out often to clear chips. Die should never become too hot to hold in your hand and remember which direction your are threading - right or left hand.

After the die is all the way up to the shoulder, unscrew and repeat, leading with the flat side. It should cut the last few threads a bit more. Then lightly file and sand any burs from the edge of the shoulder, careful to keep it squared. Then, by rotating the barrel 45 degrees against a sanding block, (fine - 180 grit or less) Break the sharp 90 degree edge just to the point where it won't cut you.

You are now going to relieve the threading with the edge of a thin, 6" file, all the way around the barrel at the shoulder. Cut only the thickness of the threads. You then use a triangle file to bevel the thread 60 degrees out of this groove you have cut. You can do the same at the start of the threading. When you are done, screw the die back on to chase any burs. Your metric brake will now screw on.

THREADING INCH PATTERN

The procedure for inch pattern barrels is the same as for metric barrels, however when you are done, you must align the bayonet lug (if permitted) at 6 o'clock and make a pin prick to mark the spot. Unscrew the flash hider. Now take your smallest cut-off wheel (a small one about ¼" diameter is best) and Dremel tool and cut a small radius for the indexing washer. Test fit the flash hider with the washer and when the three holes align, drive in the pin and stake the sides.

L1A1s come with a washer that fits inside the flash hider so when tightened on, the flash hider indexes properly. The thickness of this washer controls the point of indexing. Although not absolutely necessary, it eliminates the slight wobble you may experience without it, as would judicious application of permanent thread-locking compound. Take a .308" drill rod and insure that your hider is aligned. If not, drill it out so you don't shoot it off.

Type I receiver

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LESSON 205: TUNING THE GAS SYSTEM
(Revised 09-22-00)

There are several factors that contribute to proper cycling in a FAL. Most important is the gas pressure created from the burning propellant that forces the projectile down the barrel. As the projectile passes the gas port, the pressure works in three directions. First, it continues to propel the projectile down the barrel; second, it is exerted outwardly from the inside of the cartridge case against the chamber walls. Third, it travels through the gas port, through the gas block/sight assembly, and puts pressure on the face of the gas piston, driving it back against the bolt carrier and initiating unlocking and cycling. The timing of this step coincides with a drop in the pressure exerted inside the cartridge case against the chamber walls, which allows the cartridge case to extract. When the projectile exits the barrel, pressure drops to zero because the gas vents through the end of the barrel. There is a pressure-time curve; critical to cycling the action is not just the total volume of gas and gas pressure, but how long that pressure is maintained. The longer the barrel, the longer the projectile blocks gas from escaping out the end of the barrel and directs it through the gas port. A shorter barrels mean a shorter time that the projectile is between the gas port and the end of the barrel, and must have a larger diameter hole to bleed the same volume of gas in a shorter time frame. If the hole is too large, the outward pressure exerted by cartridge case has not dropped sufficiently for the case to be extracted, but the piston is forcing the bolt carrier to the rear anyway resulting in extractor failure or the extractor rips the rim off the cartridge.

Another factor is muzzle devices. L1A1 style flash hiders are designed to dissipate and cool gas in as large an area as possible, thereby reducing the flash signature. Muzzle brakes that have an exit hole of a smaller diameter than the inside of the device, trap gas in this expansion chamber. As the larger volume of lower pressure gas strikes the portion of the muzzle device where the exit hole is reduced, it creates back pressure, which adds to the pressure on the gas piston. This is why removing a muzzle brake from a gun that was tuned with one in place may prevent it from cycling.

A gas plug fits into the front sight assembly and both retains the piston and directs gas flow. There are many styles and not all are compatible with all front sight variations. Israeli are shorter than metric and use a longer gas piston. Inch pattern are also shorter than metric, but use a gas piston that is slightly different, but interchangeable with metric. There is a hole in this piston that directs gas to the piston. Rotating this piston 180 degrees blocks the gas from hitting the piston. This position was used for imparting maximum pressure on rifle grenades, but has caused many a novice panic at one time or another over their "single-shot" rifle. A line, a scallop cut, an "A" or a Hebrew *aleph* (א) usually indicates the firing position. The single shot grenade position is either unmarked or marked with a "G" or a "Gr." As the gas passes through the plug and hits the piston, the piston begins moving rearward. At this point, the gas pressure may vent through a hole at the rear of the front sight assembly. A rotating ring called a gas regulator covers this hole. The gas regulator is numbered, depending on variation, from 1 up to 7 on metric, from 1-11 on inch (sometimes not numbered at all, such as Brazilian guns). At 1, the hole is completely covered, imparting maximum pressure on the piston. At the high end, the hole is uncovered, allowing gas to bleed off and reducing pressure on the piston. The pressure may reduced so much as to prevents cycling.

Different ammunition has different pressure curves, so you must experiment with each type of ammo you use. The higher the number (the more gas bleeding off), the less violent the recoil and the less

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powerful the ejection of the spent case. On weapons with a last-round bolt hold-open, open the gas port all the way, then fire with one round in the magazine. Close the port one number at a time until the bolt locks open consistently 5 times. This is your maximum gas setting. For reliability, drop one or two numbers (2 to four clicks) more. If you have an L1A1 style gun, or one that lacks the last-round bolt hold-open device, you will have to experiment to determine the ideal setting. If it only works on 1 or two, there is not much room for error, such as when your gas port begins to foul. The remedy is to increase the diameter of the gas port.

Access the gas port by disassembling your front sight assembly, removing the gas regulator, plug and piston. On metric guns, remove the front sight. On inch pattern guns, the gas port is drilled diagonally from behind the front sight into the barrel. On metric guns, the hole is vertical through a hole behind the hole through which the front sight is threaded. Both guns with standard length barrels have a nominal gas port diameter of .096 - .098".. A conservative gunplumber will increase the diameter a bit at a time, until the desired pressure is achieved. With an 18" barrel, I am usually successful with a .116" to .118" . 16" barrels usually work with a .118, occasionally with a .120. At one time, inch pattern rifles with 21" barrels were "product improved" to a 2.75mm (.108") I recommend, however, that you make the hole no larger than necessary for the desired results. Too large a gas port can "shave" bits of copper off the projectile, causing fouling and malfunctions, or rip cartridge rims due to the chamber pressure being too high at the moment of attempted extraction. The following table identifies relevant drill sizes.

#41	.0960"	#36	.1065"	#32	.1160"
#40	.0980"	#35	.1100"	3mm	.1181"
#39	.0995"	#34	.1110	#31	.1200"
#38	.1015"	#33	.1130	3.1 mm	.1220"
#37	.1040"	2.9mm	.1142"	1/8"	.1250"

If a full length barrel with a .096"+ gas port is not cycling, it is probable that the gas piston is too small in diameter or the tube is too large. There should be no lateral movement of the piston in the tube. This allows gas to blow by the piston, instead of actuating it. The easiest remedy is to buy a new piston. Failing that, you can build up the tube or piston with nickel plating or hard chrome until they are a tighter fit. Insure also that the gas tube is indexed properly and the retaining roll pin installed correctly. There are two holes pointing downward oblique to the gas tube. As the piston reaches its maximum travel, it clears these two holes, allowing any excess pressure to bleed off and reduce wear on the gun.

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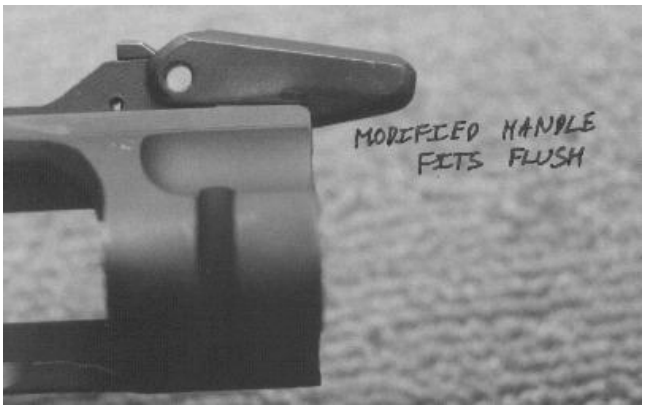
LESSON 207: FOLDING COCKING HANDLE ON A METRIC RECEIVERS
(Revised 05-10-00)

There are three types of charging handles (handle, slide cocking) available. One sticks straight out (aluminum or hard rubber) and is typical on metric guns. One folds alongside the receiver (fat = India, thin is other Commonwealth). One sticks out, is spring loaded, incorporates a forward assist, and is typical of Israeli guns. There are a few other experimental variations, Early L2A1, etc, that we won't get into.

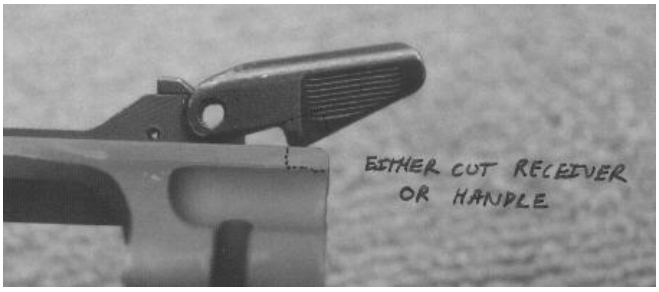
What is "correct" for your gun is of no interest to me. The audience for these lessons is typically not collectors, or they would be buying NIB 50.00 guns, drinking sherry with a pinky in the air, and speaking with nasal intonations. The target audience for this series is folks who like to shoot and use a shovel to pick up their brass. As such, lets evaluate the cocking handles as they are used.

> FOLDING: Difficult to grab with gloved hands, slower. Makes the weapon much easier to carry, especially when slung. Doesn't snag on web gear or gouge your back.
>
> STANDARD METRIC: Easy to grab in all conditions. Rubber or plastic insulated from cold. Aluminum style not as durable, but can be refinished with bake-on processes where the rubber would melt. Snags on web gear, digs into back when slung.
>
> ISRAELI. Even larger than standard metric, Snags on web gear, digs into back when slung. Forward assist is a dubious value. On one hand, it allows you to force a defective round into the chamber, or to force a round into a partially obstructed chamber. On the other hand, if there is a problem with the round or chamber, isn't clearing the malfunction better than forcing it closed?

Now, there are metric guns that have the folding cocking handle, mostly paratrooper models, but this metric folder is rare. You may also have a generic Century Arms receiver that has features of both Inch and Metric features. The folding cocking handle will still fit, however it will not fold flush with the receiver. This lesson explains how to cut the notch (either in the receiver or the handle) for your handle to fold flush.



There are at least three sizes of folding cocking handles. The standard inch pattern, the Indian, and the metric. Each may be slightly different in dimensions. Scribe a line .300" from the front face of the receiver on the cocking slide channel. Using a rotary cutting tool or a grinder, hog-out material up to that line. Finish with a sharp file. Test fit with the weapon assembled and verify that the handle snaps into place. Sometimes the cocking handle will have to be narrowed to fit on a metric receiver. The .300 dimension is taken from a Lithgow Australian L1A1 receiver. In some other receivers, this is too much. You may choose to start at .260" and test fit, to find the point where the cocking slide snaps into place. The cocking slide handle moves further forward when under pressure from the bolt carrier, so test fit with the rifle assembled and under spring pressure.



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You may also choose to remove the material from the inside of the cocking handle by carefully filing or cutting on a mill. While more difficult, this method is safer as it modifies the least expensive part. The long "slide" portion of the cocking handle may need to be reduced slightly in height or width to move freely. Height can be adjusted by holding flat on a belt sander. Width and fine adjustments should be done by careful hand filing or sanding. If close, but still binding slightly, coat with a lapping compound and work back and forth until it moves smoothly.

Post-Ban FAL Built with DSA Type I receiver by Arizona Response Systems

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LESSON 208: ADJUSTING THE LATCH, LOCKING BODY
(Revised 09-23-00)

The upper and lower receivers on the FAL are hinged to facilitate cleaning. The two halves snap shut and lock. A lever (lever, locking catch assembly) on the left side of the receiver unlocks the upper receiver by disengaging the catch (catch, locking body). A poor fit of this part results in the receiver snapping open unexpectedly or a wiggle between the upper and lower. The catch is self-adjusting so it can compensate for wear. It is normal and desirable for the lever to to be slightly to the rear of straight up. As the engagement surfaces wear, the lever moves forward. When the lever has moved to the point where it has contacted the rear of the receiver plate, a loose, sloppy fit between upper and lower will soon follow. There are three types of levers: a long upright lever, a short upright lever, and a lever that points forward. There are several cosmetic variations of each type, depending on whether the part is a stamping, one-piece machined, or two parts welded together. The long upright lever is standard. Airborne forces discovered that a parachute harness could activate this lever. Additionally, the inertia of launching rifle-grenades could jar the lever rearward. So FN shortened it, which increased the amount of force needed to move it. Another solution common on paratrooper FALs and most Israeli and South African FALs is a small lever pointing forward. I originally thought this was more desirable, because it's less common, cool looking, and out of the way (or so I thought). After taking a three-day Urban Carbine Instructor's Course with a SAR-48 Para, I decided against this configuration. It is too close to the selector lever and after snapping the safety on and off a few thousand times, I ended up with a blistered, bloody gash on the inside of my left thumb where the edge of this part rubbed.

Often a new receiver combined with a new catch will cause the weapon to snap open. You fix this by modifying the catch. Follow the rule of "cut on the least expensive part" and leave the tab on the receiver alone. Properly adjusted, the lever should point about 5 degrees to the rear. As the parts wear (years of heavy use), it will move into the vertical position.

First remove the stock assembly. There is a screw in the rear (screw, retaining, locking catch body). Removing this frees the cross-pin (pin, retaining, locking catch). Be careful as this pin retains a spring and plunger that are under tension (stay, locking catch spring). You can now remove the lever and the catch. Apply Dykem or marker pen on the engagement surface and reassemble. Work the upper receiver open and closed several times. Disassemble and hone or sand the high point where the Dykem was rubbed away. Repeat this procedure until the latch positively locks. Test by inverting the rifle and tapping the end of the barrel on your bench. The receiver must not pop open.

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LESSON 209: StG-58 BIPOD REMOVAL

(Revised 09-22-00)

StG-58 FAL kits come with a bipod attached. This bipod is often difficult to remove. The large screws on which the legs pivot are screwed in and locked with crown nuts. These crown nuts are maintained in place by a thread locking compound and 30 years of hardened grease so it may need to be heated for easier removal. You should get a large, expendable screwdriver at a junk sale to convert to a spanner. Grind a notch in the center to clear the shank of the screw - you're looking for around 9/32" wide and about 5/32" deep. You can also take a punch or expendable screwdriver and use it as a punch in the slots on the crown nut to hammer them free. This usually won't ruin the nuts, but will gouge them severely. I have found no need for thread locking compound during reassembly.

You can fabricate a wrench for these crown nuts with a 7mm closed end wrench. Mark the four teeth and cut away the area between them with a cut-off wheel. You will probably have to decrease the thickness of the wrench slightly to clear the part of the bipod that goes around the barrel. File the area between the teeth for a nice finish. To keep from slipping, briefly heat the nuts with a torch (10 seconds is fine), squeeze this wrench against the crown nut with wide-jawed pliers, and turn.

LESSON 210: INCH SELECTOR ON METRIC LOWER

(Revised 09-22-00)

Some people prefer the larger knob on the inch pattern selector. It can be modified to fit on a metric lower receiver. On the inch selector, a large vertical tab prevents moving to the automatic firing position by stopping against the upper receiver. Scribe a line around the outside edge of the selector, then draw a notch that will act as a stop against the pin protruding from your lower. leave extra material around this notch. Once you have cut the tab off, it will be easy to insert the selector in the lower receiver to determine how much material needs to be removed so as to have the notch stop on the pin at the same time the detent on the underside clicks into its recess on the receiver.

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LESSON 211: INSTALLING A MUZZLE CONTROL DEVICE

(Revised 09-01-99)

To the best of my understanding, the current rules prohibit exposed threads on a rifle, as it would permit the easy attachment of a flash hider. While "flash-hiders" are forbidden, "muzzle control devices" are specifically allowed. As I read the rules, you may thread the muzzle, so long as you then permanently attach the muzzle control device. "Permanently" can include welding, high temperature silver solder (1100 degree or higher melting point), or pinning. If pinned, the pin must then be welded over or a "one-way" pin that cannot be readily drifted out. A permanently attached muzzle device is included in determining overall barrel length (minimum 16").

The AK-74 brake that is available for the 7.62x39 AK works well and is inexpensive and already threaded for metric guns. If you get a true AK-74 brake, designed for the 5.45mm round, insure it is bored out to >.315". The original Belgium Style or Argentine/Brazilian style brake seems to comply with the definition of "muzzle control device" versus "flash hider" and is what I recommend. It does have a bayonet notch. Although a "notch" is not a "lug" you may wish to remove enough material from the rear of the brake to eliminate this feature. The DSA Brake is nice, fits well, and is loud. I recommend it also. The Hesse Arms units are supposed to be a slip-fit, but usually have too small an internal diameter and need to be enlarged before soldering in place. . Coincidentally, they are usually small enough to thread internally 15mm x 1.0 (HK) and the barrel is wide enough to thread the same without turning it down. While you won't have the desired 60%+ thread engagement, it is enough to hold it in place and gives a great grip for silver solder. The Smith Enterprises brakes are horrible and I don't recommend them at all. They are in three pieces, so each part must be welded, pinned, or soldered and you have four unsightly wrench flats remaining.

PINNING A MUZZLE CONTROL DEVICE

I have found the pinning way to be easy only if the muzzle device is not hardened metal. Screw the muzzle device on and index. Split washers or lock washers may be used to obtain proper index. Drill a hole that intersects both the inside of the muzzle device and the outside of the barrel. Drill this hole almost, but not quite all the way through. Then drive a pin into this hole, preferably a tapered pin. Now, you cannot pound the pin out from the other side because the hole doesn't go all the way through (thus a "blind" hole). The problem is trying to drill a hole on the edge of a round object - the drill bit has a tendency to walk. The solution is to first cut a tiny flat, then center punch it to create a divot that the drill bit can grab onto and not slip. Grind the end of the pin flush and touch up. A drill press is helpful, but not required. The only way to remove it is to cut it off, or drill the pin out, neither of which count as "readily convertible". If you have drilled all the way through, you must then weld up one or both sides, file to fit, paint to match.

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SILVER SOLDERING A MUZZLE CONTROL DEVICE

Silver soldering is as much an art as a science. What is critical is that your solder, flux, and heat source are all appropriate for the temperature you will be operating at (>1100 degrees F.). Also critical is that your surface is absolutely oil free. I recommend sand blasting, then degreasing in alcohol, acetone, lacquer thinner or Methyl Ethyl Ketone (MEK). For most applications, a propane torch will not generate sufficient heat for high temperature solder. I recommend an oxygen-acetylene torch or MAPP Gas. Follow manufacturer's caution with regard to fumes. Most of the parts I have soldered turn a dull red at 1100 degrees, and cherry soon after.

In theory, you clean and flux the parts to be soldered, heat, then apply the silver solder and it will flow evenly into all the gaps in your work area, neatly and permanently attaching your parts. I have not been particularly successful with this method. I have attached DSA brakes using Brownells' "Silvaloy 355" (1/2 oz $15 #080-538-405) ribbon. I cut a piece of ribbon that matches the barrel circumference, flux the threads and barrel, wrap the ribbon around the barrel right behind the threads, then screw the brake on. Heat until cherry. Melts at 1145 degrees, flows at 1205 degrees.

My favorite is a product from Brownells called "Fusion" Silver Solder Paste. It is a paste that has flux and silver powder pre-mixed. It is excellent for attaching brakes. Simply apply the paste to the threads, screw the muzzle control device on, index it, and then heat with MAPP gas until it turns dull red. You will see the silver melt. Let cool, wire brush, and you're done. I have found it to be a little messy in the clean-up, but if the gun is to be painted or refinished, this is not a big deal. The STL 1205 Silver Braze melts at 1100 degrees and costs $26 for 1 oz. One ounce should do 10+ jobs. Stock number #322-100-650

LESSON 212: INDEXING AN L1A1 FLASH HIDER

(Revised 01-15-01)

The British, Canadian, and Australian bayonet/flash hiders have a small lug in back of the bayonet lug. There is a hole for a cross-pin and a washer. The end of the barrel also has a small groove right before the threading stops. This is how the Flash hider locks in place. Without it, the hider could unscrew during use. You need to thread the hider on and index it so the bayonet lug is at 6 o'clock. Then insert the washer through the rear lug, engaging the groove in the barrel, and pin in place. You may or may not have a tiny washer that fits between the end of the barrel and the inside of the flash hider. This washer is made in a variety of widths and is to increase the rigidity of the hider. The washer should be thick enough so the hider stops a few degrees short of proper alignment and you torque it the last few degrees. It is easy to break the bayonet lug or washer tabs off. A special tool helps prevent damage. The photo below shows an original flash hider tool, a handmade version, and one for the differently shaped Belgium long flash hider.

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LESSON 304: ADJUSTING THE TRIGGER
(Revised 01-15-01)

Giving directions on trigger adjustment is always scary. I'm waiting for somebody to disregard all cautions and render the trigger unsafe, shoot somebody and try to make it my fault. Be careful. If you are not totally confident - don't do it.

FAL triggers cannot be made into Olympic-grade target triggers, but they can be improved dramatically. Metric guns require three hands (or a slave pin) for reassembly. Inch guns come with a slave-pin installed. Metric guns have a spring and plunger between the sear and the trigger; inch guns have only a spring.

When the selector (change spindle) is placed in the fire position, it allows for movement of the trigger. The hammer is held by the nose of the sear engaging in the sear notch (hammer bent). The hammer and the hammer spring keep the sear to the rear so that the sear tail lies over the raised part of the trigger tail with the sear spring compressed. When the trigger is pressed, the tail of the trigger pivots the tail of the sear upwards. This disengages the nose of the sear allowing the hammer to fly forward and strike the firing pin under pressure of the hammer spring. The sear, now free of the hammer notch, moves forward until it clears the raised portion on the tail of the trigger. It can now rise up and bear against the underside of the hammer.

During the backward movement of the bolt carrier, the hammer is rotated rear and downward. When the bolt carrier is to the rear, it is holding the hammer down. The sear is now in position behind the sear notch, but is not engaged. As the bolt carrier returns forward, the sear engages the sear notch, but the tail of the sear sits below the tail of the trigger. Only after the trigger is released will the sear tail rest on top of the trigger tail and allow the cycle to repeat.

All three springs - the hammer spring, trigger return spring, and sear spring - are balanced. The hammer spring must be heavy enough to override the firing pin spring and detonate even hard primers, yet the sear spring has to override this tension to disengage the tail of the trigger. The trigger return spring needs to be light enough for a comfortable, controllable trigger press, yet heavy enough to return the trigger forward and disengage the sear. Modifying any one of these three springs will affect the others to some extent.

There are some subtle differences between FAL models. The Argentine and Brazilian trigger return spring are usually heavier than the Belgium or Austrian version. The semi automatic Brazilian trigger return plunger is equipped with a ring that serves to limit over-travel, which prevents full automatic fire . Thumbhole stock L1A1s have a non-standard replacement trigger return spring that is simply horrid.

To effect a good trigger job, the nose and tail of the sear must be honed to a high polish. The edges must be kept sharp and the original angles must be maintained. Often, on a parts kit, there will be a substantial burr raised on the nose of the sear. I recommend a fine honing stone with the sear secured in a vise in such a manner that the honing stone move parallel to the bench. This makes it easier to visualize and maintain the correct angles. The notch in the tail of the trigger must also be honed.

Polish the sear and hammer pins to insure the sear and hammer move freely. Polishing the sear notch on the hammer is difficult without a stone of the correct thickness and angle. Sixty degree triangle stones will usually work. Changing the depth of the sear notch in the hammer adjusts creep. It is also a critical adjustment and can result in “hammer follow,” a dangerous condition where the sear slips out of engagement and the weapon doubles, or fires automatically without the benefit of a safety sear. The sharper the sear, the more shallow this notch can safely be, but a slight rounding of the top of the sear makes for a smoother release. Typically, factory new hammers have around a .030" notch. I do not recommend reducing this below .020" and even that is only in conjunction with a perfect sear.

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Light triggers are created in part by reducing the contact surface between the hammer and sear. Unsafe triggers are usually caused by too short or shallow sear/hammer engagement, rather than too narrow. You can break the outside corners of the sear, which will reduce slightly the width of sear engagement without affecting depth.

Remove and polish the round tip of the trigger return plunger. Polish the round end of the hammer spring guide as well and insure the shaft is free from burrs. Polish the plate that retains the hammer and sear axis, where it touches the side of the hammer.

These steps by themselves will make for a significantly improved trigger pull. It will still be heavier than a bolt-action "Match" rifle, but the mush will be gone. Further adjustment involves changing springs. Unless you have a large supply of springs, I do not recommend you undertake this step.

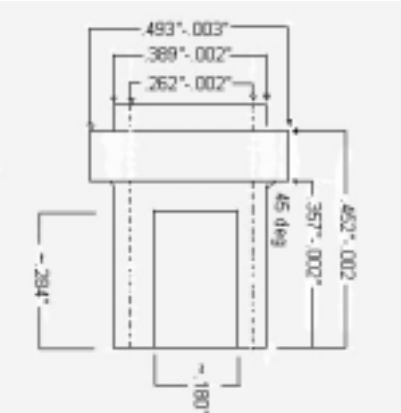
You want to make the trigger return spring a little lighter. You can sometimes substitute a Steyr sear spring in many cases, but test to insure enough pressure to return the trigger forward. The first rule of gunsmithing is never cut a coil spring. You do not want to change the overall length of the spring when under load. The solution is a spring of the same loaded length, but reduced power. W.C. Wolff company is a great source for springs. Select a spring that is a lighter load rating, but same loaded length as the original. Do not adjust the sear spring. This spring, if too light, will also prevent the trigger from returning forward, or have too little pressure to positively re-engage the hammer notch.

Breaking the sharp edges on the sides of the trigger can also improve the trigger feel. Slick trigger oils are good too, but I recommend applying only after reassembly.

After working on your sear and hammer, reassemble the lower receiver and pull the trigger. Watch the hammer. If the hammer comes back slightly before releasing, the angle on your sear is incorrect. The top edge of the sear is longer than the bottom edge. What is happening is the top edge slides across the sear notch, pushing the bottom of the sear notch forward (and therefore the top of the hammer back). Change the angle slightly so these two surfaces are as parallel to each other as possible.

Double check the safety of your weapon by holding the trigger to the rear on an assembled rifle and work the action vigorously. If the hammer follows forward even once, you have a very unsafe condition and must either recut the angles to get more sear engagement, or replace the parts.

Should you have a Century Arms Commonwealth thumbhole stock and wish to replace it with the superior DSA “Dragunov” style thumbhole stock, or a pistol grip, there are two additional problem in obtaining a satisfactory trigger pull. First, the plate covering the trigger return spring has a tab on it that engages a slot on the bottom of the inch-pattern lower receiver. Second, there is a stud protruding from the bottom of the Commonwealth receiver. Century Arms hacks these off to fit their thumbhole stock. This allows the standard pistol grip to move, and since the trigger return spring and plunger are part of the pistol grip, these changes the trigger pull. Also, without the tab, the plate can move and put friction on the plunger. The trigger return spring Century uses on the thumbhole is not the original one – it is longer and should be replaced when retrofitting to standard pistol grip. The plate and stud locates the pistol grip and prevent lateral and front to rear movement. The plate must be welded and recut, or replaced.. The stud must be fabricated and glued, welded, or soldered on, or the entire lower replaced.



L1A1 pistol grip stud
repairs CAI thumbhole lower

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LESSON 800: PARTS EVALUATION
(updated 01-15-01)

To comply with the various and sundry laws, some perfectly good original parts must be replaced with US made parts. Some are excellent, some are pretty pathetic. Additionally, several companies make custom parts and accessories, and armorer tools. I have made the following reviews as objective as possible, although I freely admit that if a company makes 9 parts that are crappy, I'm not going to be too optimistic about the 10th one.

DSA US cocking handle. Aluminum (T7075T6 –very hard) anodized, with plastic knob. Very nicely made. The hole for retaining the peg is sometimes a bit large and a tiny stake mark on either side will insure the roll pin does not fall out. While the original Austrian knob is some kind of rubber-like plastic substance, the DSA is made of a different type of plastic. Subjecting the Austrian to paint curing temperatures (300 degrees F. for 1 hour) will usually cause it to dry and crack. Subjecting the DSA to 300 degrees for an hour will cause it to melt. Curing for 2 hours at 200 degrees seems to be the best choice. (Alloy $50, stainless $60)

Schneider Machine US cocking handle. 4140 steel, in the white. Requires using the original plunger and peg. retaining pin may be slightly tight and require enlarging slightly groove in peg original ones are probably drilled together. Includes new plastic handle that can handle 300 degree curing or bluing temperatures. Requires riveting (rivet included. While require a bit more skill to install than the drop-in DSA unit, this handle offers the gunsmith more options in matching the part's finish to the rest of the gun. Excellent customer support available.

DSA US muzzle brake, standard. Threaded, excellent, with three ports on either side, somewhat loud. ($25)

DSA US muzzle brake, short. Two small ports on either side, one large cut-out on top. There is no relief cut on the back of this brake, so it may be difficult to index properly. I lathe counter-bore the brake about three threads deep so that rather than butting up flush with the shoulder (and not timing to top dead center) it extends a few threads over the 15mm portion of the barrel and looks neater. Otherwise excellent, particularly on short barrels. Looks funny on a full-length barrel. ($25)

DSA fake long flashider. Threaded, resembles the Belgium long flashider. Serves no function other than cosmetics. Looks very nice. ($35)

Hesse Arms US muzzle brake. This is supposed to be a slip fit, but is usually under-size. It looks most like the original Belgium design with two sets of three small ports, one at 10 and one at 2 o'clock, and set-screws in place. I think the set screws are ugly. I turn the portion of the brake with the set screws off and solder into place. Because it is such a tight fit, it tends to prevent solder from flowing well and covering the whole area. I turn a few shallow grooves in the portion of the barrel that will be under the brake and fill these grooves with solder prior to pressing the brake on. It can also be threaded 15mm x 1.0 RH (standard HK rifle pitch) and your barrel threaded the same. There are a few situations where this brake is particularly desirable: it can be attached without removing the barrel, and it can be welded to the Israel bipod coupler. its the Israeli bipod coupler well. A major shortcoming is the brake tends to increase felt recoil. I believe this is because there is a reduced diameter exit hole, which acts as a baffle. I don't think it allows gas to escape fast enough. I typically bore the exit hole wider like on the original. This CAN be used as an advantage on short barreled rifles that are gas starved, as the increased recoil impulse can compensate for lost gas pressure. Now offered threaded.

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Entre'prise "Zero Climb" muzzle brake. Very similar to the DSA with the addition of two top ports. While slightly rougher machining than the DSA, the holes are nicely chamfered and my test sample indexed perfectly. A complete review with photos is in the NOTES section of the ARS website. ($25)

Smith Enterprises US muzzle brake for standard barrel. I won't use it. See text under attaching brakes for details.

Smith Enterprises US muzzle brake for Israeli FALO. There are two types. One is male threaded for insertion in the Israeli FALO bipod coupler. The other is female threaded and includes a smaller coupler that precludes the use of a bipod. The latter is good for short "Congo" heavy barrels. For a trimmer look on the former, remove the indexing nut and time by removing material both from the shank and shoulder. Test fit bipod before refinishing as the back shoulder will probably have to be beveled slightly.

TAPCO StG-58 "Stoll" look-alike muzzle brake. Excellent. 5 sets of two ports. Resembles original. Matte blue finish. LH thread. ($25).

DSA gas piston. Perfect. Can be differentiated from original by non-threaded hole on end. ($35)

FSE gas piston. Generally good. A few not heat treated. Can be discerned from original by three grooves on head instead of two.

FA Enterprises Inc. gas piston. Unique two-piece stainless design. identified by pipewrench marks on shaft. Standard on currend CAI guns. Garbage. 100 rounds of FA beat it to pieces, compressing and flaring the junction of the two halves to the point it had to be pounded out of the gun, badly bent.

First Son Enterprises (FSE) US hammer, trigger, sear: FSE is out of business, but the parts are still around. Nicely finished. There was a small batch of overly-hardened hammers that shattered after a few rounds. Earlier hammers also had the full-auto sear notch removed which was to insure that it could not be considered by firearm-design ignorant baby-burners as a "machinegun part" Unfortunately, it served an additional function by engaging the lip on the locking plate to keep the hammer from flying so far forward as to disengage the hammer strut and send that part downrange. Removing the notch entirely lets the hammer strut launch downrange, but removing it partially causes the resulting angular "wedge" to break the front lip of the locking plate. The solution is to either machine or cut with a rotary tool cutting disc a small ledge to engage the lip on the locking plate. Later production parts retained this notch. The trigger and sear are excellent. Overall, I have been pleased with FSE. The surface finish on the parts is the best I have seen and they have the additional nice feature of being clearly engraved "FSE US." Occasionally, the sear nose needs to be shortened a few thousands slightly to engage the hammer.

Hesse Arms US hammer, trigger, sear. The hammer and trigger are the roughest cast of available parts and need considerable filing and polishing to remove the mold marks. The mould mark on the hammer crosses the sear notch, which must be trued for a good trigger. Some hammers show warpage which causes them to bind on the receiver or the rat-tail of the bolt carrier. The hole for the hammer pin is also not perpendicular to the hammer axis. Sometimes the hole is undersize also. Best bet in those cases is to return. Robert Hesse advertises an unconditional, money-back guarantee. Compared to the hammer and trigger, the Hesse Arms sears I have used are excellent. See the section on trigger jobs to insure the nose angle is correct. I think they are more trouble than they are worth, and I won't bother with them when the DSA isreadily available.

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Century Arms US hammer, trigger, sear. I have installed two sets. Both were horrid – cast like the Hesse, only worse. The location in the hammer for the strut is off, which contributes to hammer-follow. They are marked with a "C" and may be made by century. I won't use them.

Entre'prise Arms US hammer, trigger, sear. They worked. Hammer would not always reset when manually cocked with the lower out of the rifle – which was really odd, but assembled the set works fine. A complete review with photos is available on the ARS website.

DSA US hammer, trigger, sear. Excellent. Occasionally the oval hole in the sear is a tiny bit too small and needs to be sanded or filed with a tiny chainsaw sharpening file. Otherwise it does not move freely on the sear/trigger pin, but causes the pin itself to move. They are expensive, but tested and sold as sets with carefully ground angles. ($90)

DSA US pistol grip, handguards (plastic). Excellent. The mould – ejection mark for the pistol grip is right at the web of your hand and can sometimes be annoying. Sand smooth. ($25)

FSE US pistol grip (plastic) Perfect. Clearly marked "FSE USA"

Century Arms International Pistol Grip (plastic). I have only seen these on CAI built guns and do not believe they are available for sale as an individual item. Nevertheless, they are perfect. They are thinner in the area where the thumb and forefinger go and I think they are more comfortable than the original.

Hesse Arms US pistol grip (plastic). Excellent - slightly textured resin. Although the mould marks for where the hole should be drilled are in the right place, I frequently receive these with the hole drilled either too small a diameter or slightly off center. You can elongate the hole rather easily to the correct location, or return for warranty replacement.

Hesse Arms US stock (plastic). Horrible. Hump-back style which is nice and the same fine texturing as the pistol grip, but the stock fits so poorly that I don't bother with them any more. The relief hole that allows the locking body to retract is too shallow and in the wrong spot, and there is a small gap between the receiver and the stock and a huge gap between the rubber butt pad and the stock – both the common StG-58 rubber butt pad and the somewhat rare Argentine, Belgium, and Brazilian butt pads have this huge, unsightly gap.

Hesse US pistol grip, stock, handguards (wood). Complete abortions. The most disgusting pieces of crap I have ever seen. Started as pretty nice pieces of wood, but looks like it was shaped by angry beavers.

Ironwood Designs US pistol grip, stock, handguards (wood). Very nice. Sold as unfinished wood only. Requires some minor work. Top of pistol grip needs to be beveled in slightly to match original contour. Bottom edge is a little sharp and should be lightly sanded for comfort. Occasionally the hole for pistol grip nut needs to be enlarged a tiny bit – the nut will fit, but it is sometimes hard to get the nut started without slightly enlarging hole. Butstock needs to be beveled a tiny bit to get a snug fit on recoil pad. A rod with sandpaper on it to deburr the inside of the recoil tube hole will allow easier insertion. Front of handguards need light sanding to break the sharp edge. Rear has slight flaring that should be taken down as well. A few coats of tung oOil or Bichwood – Casey True Oil, or linseed oil will give a satisfactory finish. Directions are on the ARS website under "NOTES" for a superfine oil finish. While earlier wood was sold "finished" and exquisite, current production are more dimensionally correct, more consistent, less expensive, but do require about an hour of light sanding and oiling for best results.

DSA semiautomatic selector. There is nothing wrong with a full-auto selector on a semi-auto receiver. It does nothing. It will fire one time in the full-auto setting, then the hammer will follow forward without firing the second time. It can be annoying, however, to easily pass through semi-auto to half-way between semi and full, where the weapon will not fire at all. DSA makes an excellent semiautomatic selector. There still are a

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large quantity of a previous production run selector that is slightly off dimensionally. At first glance, it may appear that the small tab which holds the selector in place is too wide, thereby making it difficult to move. Removing a tiny portion from the inside of this tab will work, however the problem is actually on the right side of the selector. The portion that passes through the right side of the receiver has too short a shoulder (dimensionally off the thickness of the pin retaining clip). This can be easily filed back. DSA fixed this glitch about a year ago and the new selectors are a perfect drop-in fit.

Entre'prise receiver (metric). They look nice. Previous receivers were machined from billet and oversize in the ledge over the chamber, the locking body ledge, and the receiver face/torque shoulder, and I have also found several that had the part where the barrel threads in bored off center. Current production are cast and then finish machined to a type I or type III configuration. While still flawed in a number of areas, they are far superior to earlier attempts. Unlike FN-licensed or DSA receivers, they are heat treated only in the area where the barrel screws in. A complete review with photographs is available on the ARS website under "NOTES." After some serious conflict with an Entre'prise representative, I no longer have any confidence in the company, or the integrity of the company's representative, and therefore I maintain serious reservations on the company's products, despite some significant improvements.

Imbel receivers. Usually excellent, the receivers marked *"Pacific Armament Company"* and possibly some others have a large gear-like logo stamped on the right side of the receiver and a deep *"Fz SA 7.62mm"* on the left. I have seen some where these stamps are so deep as to cause a slight imprint inside the receiver rails, which binds the bolt carrier. A few file strokes will eliminate this problem. Have also seen Imbels where the relief cut for the extractor is insufficient, causing the bolt to bind when chambering a round. Can be polished out with a tiny grinding stone, followed by a fine Cratex abrasive "bullet."

Hesse Arms receiver. Roughly cast, they are ugly with lots of pitting and porosity flaws. The etched or cast-in markings are sloppy. Dimensionally, later production ones are not as bad as their sloppy appearance would indicate, however after years of dealing with poor quality and shoddy workmanship from this company, including a thousand receivers sold to Century Arms that Robert knew were shoddy ("because Century wanted them that way"), I have decided not to work with them. I won't sink my valuable time into something when I cannot guarantee customer satisfaction with the results.

DSA receiver (carbon steel). Slightly undersize in the undercut where the front of the dust cover goes. Easiest fix is cutting a slight taper on the leading edge of the dust cover nose. Otherwise, a hard smack with a mallet will force the dust cover into place. Sometimes the extractor relief cut needs enlarging (see section on receiver prep). Otherwise an excellent receiver and the only US receiver I can recommend. Available in Type I only, with or without the cut for the carry handle.

DSA receiver (stainless steel). I have not built enough guns on these receivers for a fair evaluation. In my opinion, the potential increase in the corrosion resistance of stainless steel is not worth the significantly higher price. It also limits refinishing options (no bluing or Parkerizing).

Armscorp receiver: I have only built six guns on Armscorp receivers. Three went together fine, three were as bad as earlier Entre'prise, and in the same areas. Also, the feed ramp is only a shelf, without the semi-circular cuts that raise the nose of the round up to the chamber, leading to the bullet impacting at the receiver face and not chambering. Careful cutting with a fine toothed rotary tool bit can install these missing cuts. More expensive and disappointing. I won't work on them.

DSA Free-Float Handguards. (aluminum or carbon fiber) Excellent. A somewhat tedious balancing act to install, but they come with excellent directions. Must remove entire rear support of handguards to access the gas tube rear support cap. If putting on an assembled gun, you must cut the existing rear handguard support.

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Schneider Machine "Sling Thingy." A plate that fits between the rear of the lower receiver and the stock that allows the attachment of a side mounted sling (slot on L side, eyelet on right side). Nicely made. Precludes use of tang screw, or requires re-drilling of tang screw hole.

I can't remember where I found this sketch, or who drew it, but it shows nicely a South African R1 FAL

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FAL MALFUNCTIONS

(updated 09-01-99)

In the years I've been building FAL rifles, I have come across two categories of malfunction that are usually correctable, which I will classify as opening malfunctions and closing malfunctions. An opening malfunction is when the bolt does not unlock, or travel rearward far enough after firing to lock open on an empty magazine or to strip a new round. Closing malfunctions are those where a new round is stripped but does not completely chamber, leaving the bolt unlocked. Proper parts selection and preparation can mitigate both.

RECEIVER PREPERATION

I recommend you take the following steps in preparing any receiver for assembly. While the vast majority of guns built on Argentine, Brazilian, or DSA receivers will not malfunction, these modifications do not hurt and are easier to perform before mounting a barrel.

1. Take a fine 12"+ mill file and true the receiver inside flats of the receiver. Just a few strokes will show you where the high spots are. Take a few strokes until the bare metal shows for pretty much the whole length. You can use a safe edge file, or carefully use one with teeth on the sides. Pay particular attention to the right side where the ejector block aligns with the right receiver rail. This is a spot where you can clearly see the sloppy fit of Entre'prise and Armscorp receivers.

2. Take a smaller file with edges, and run the file inside the channel where the two rails on the bolt carrier ride. This is particularly important on Pacific Armament Corporation Imbels, or any other Brazilian receiver with the Imbel gear logo on the right side. The lettering is stamped too deep, which raises a small bump on the inside. A few strokes of the file will show any high spots. If you can find a honing stone small enough, that will work too, but it is important that whatever tool you select is long enough that the sides will remain parallel.

3. With a Cratex™, 3M Scotchbrite™, or very fine sanding rotary tool, break the edge of the extractor relief cut. This is the flat part over where the barrel screw in. On the right side, there is a radius cut. This gives the extractor room to cam over the rim of a cartridge (I know its technically a rimless cartridge – but for lack of a better word . . .). The FAL is not a "positive feed" system, where the round slides under the extractor from the magazine. Instead, the extractor must snap around the rim on closing. Sometimes this radius cut is too small, which does not allow the extractor to move up and right far enough to snap over the cartridge rim. Polish this area from the front as well, which is not possible to do after the barrel is mounted. Using your receiver stub, compare the tiny relief cut on the receiver just in front of the magazine well to that on your new receiver. Often the cut will not be deep enough, or will not have the proper contour. There is supposed to be a definite step here. If not, make the step with a jeweler's file or carbide burr. If all else fails, examine your ammunition for excessively thick or wide rims, or too shallow an extractor groove.

4. Insure the base of the ejector block is not bent. Sometimes the area in front of the hole where the bolt hold-open fits is bent slightly to the rear, which will cause the bolt hold-open to bind. This is relatively soft and can easily be bent back. If you will be using an L1A1 bolt hold-open on a metric or hybrid receiver, now would also be a good time to open the bolt hold open channel .001" either with a drill bit of the exact size or apiece of sandpaper wrapped around a dowel. You could also polish down the bolt hold-open or use a metric one with no ill effect,.

5. The front part of the slot where the peg on the cocking slide rides often has a burr or rough machine mark . Using a small jeweler's file, clean up this area. It may cause the cocking slide to be hard to open for the first ½ inch.

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6. Insure the rear part of the dust cover channel is not dented. If so, recut with a thin cutoff wheel. Otherwise, the receiver will shave metal off the dust cover during installation.

RECOIL SPRING TUBE

This is the culprit in many opening and closing malfunctions. They sometimes have small ripples in them – not quite a bend, but enough to raise a slight ring – similar to a bulged barrel – which can slow the spring from smooth operation. Take a rod (a section of shotgun cleaning rod is ideal) and slit the end of it. Wrap a piece of sandpaper around the end of the rod (secured in the slit), lubricate, and chuck into a power drill. Run in and out a few times. Then take a 45 cal brass or stainless cleaning brush, wrap steel wool around it, and run this through a few times with lubricant. This should get you a mirror finish. Occasionally the hole in a wood stock for the recoil spring tube will have warped slightly. This will make the stock hard to install and can put a slight bend in the tube, detracting from smooth function. Carefully ream this hole, if applicable.

Another common problem with the recoil spring tube is that it may unscrew from the lower receiver. This is bad. There is a relief cut at the 6'oclock position. It may look like it belongs at 12'oclock, but it doesn't. It is to clear the bottom of the rat tail when the bolt carrier is in the rearmost position. If it comes out, degrease and use red thread-locker to secure. There is no reason to remove this other than to replace it, and if needed, 300+ degree F. heat will loosen it. If you don't have it secured tightly, attempting to unscrew the cap on the end of the recoil spring tube may instead unscrew the tube from the receiver. If the cap is tight, first heat to melt any hardened grease.

Polish the sides of the plunger on the end of the recoil springs. Don't remove it from the springs. Also, clean the heck out of the springs. Sometimes on sluggish closing guns or guns that open with too much force, you simply need to replace these springs.

DUST COVER

Any dents will bind on the top of the bolt carrier and retard both opening and closing. Dents can be gently removed by tapping from the inside with the dust cover supported on an anvil. Sand until smooth. Significantly bent dust covers are best replaced.

RAT TAIL AND HAMMER

The rat tail of the bolt carrier is occasionally bent by attempting to slam the upper and lower receiver closed with the bolt carrier not in the forward position and properly aligned. This bend can cause binding inside the recoil spring tube, giving sluggish operation. Carefully straighten the rat tail if necessary. The hammer has a clearance cut to bypass the rat tail and strike the firing pin. Insure this is enough clearance. Some US made hammers (Hesse in particular) are either warped during heat treat or the pivot hole drilled slightly off center, which results in the hammer striking the rat tail just before striking the firing pin, resulting in light primer strikes and misfires. Assembling the rifle without the dust cover will make any areas which need to be filed and sanded easily apparent.

CHAMBER

Sometimes there are burrs in the chamber, or deposits of hardened grease. Insure it is clean. A good indication something is wrong is if an unusually small locking shoulder would be required. These deposits may be on the shoulder of the chamber, which is usually in shadow in all but the brightest direct light and can be hard to see. On even rarer occasion, the chamber is simply out of alignment or the throat not deep enough to handle the wide range of tolerances found on surplus ammo. Although the typical FAL or L1A1 barrel is chrome lined and cannot really be recut without compromising the chrome lining, chasing the chamber with a finishing reamer may shave any minor imperfections without cutting all the way through the chrome. It will definitely remove any foreign matter.

GAS BLOCK, GAS TUBE

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Two points not covered in ADJUSTING THE GAS SYSTEM can cause opening malfunctions. Simply – not enough pressure. The gas block must align with the gas port and the seal must be tight. The seal of the gas adjustment ring must be as tight as possible, while still allowing rotation. The gas piston must be a tight fit inside the gas tube, the gas tube must not rotate to block the gas port, and the gas plug must be tight inside the gas block. If the gas block moves at all, it must be repinned with a larger retaining pin, or preferably, soldered in place and then the gas port re-reamed.. Any damage to the inside of the gas block usually require replacing the barrel, as replacing the gas block with a new one (no hole drilled for the retaining pin) is a major operation. You can try different gas plugs, but serious scoring inside the gas block is usually necessitates replacement. An oversize gas tube usually necessitates replacement, but you can try a DSA gas piston, which is about .0005" oversize. An interesting experiment is to fire the rifle in the dark and look for any flame leaking.

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LESSON 850: RANDOM THOUGHTS FROM GUNPLUMBER
(updated 01-15-01)

Replacement Springs.
Below are listed easy to find (*Wolff Gunsprings*) springs either for direct replacement or for altering spring strength.

Commonwealth folding cocking handle spring may substitute *Wolff Heavy Duty Inch #5-8*, 14 coils.

Commonwealth sear spring may subastitute *Wolff Heavy Duty Inch #5-8*, 14 coils.

Commonwealth magazine catch spring: original =.825" long, .145" OD, .028" wire 15 coils, may substitute *Wolff Heavy Duty Metric #5-4.*

Commonwealth trigger return spring may substitute *Wolff #5-8 Heavy Duty English*, 16 coils or for reduced power, *Wolff #4-8 Light Duty English,* 16 coils.

Commonwealth rear sight detent may substitute *Wolff Heavy Duty Metric #5-2*, 6 coils.

Commonwealth firing pin spring. Original 1.280" long, .227" OD, .036" wire, 17 coils.

Metric rear sight detent may substitute *Wolff Heavy Duty English #5-4*, 6 coils (8 coils for tighter lock).

Metric magazine catch spring may substitute *Wolff Heavy-Duty Inch #5-4,* 10 coils

Metric sear spring may substitute *Wolf Light Duty Inch #4-7*, 11.5 coils

Metric trigger return spring may substitute *Wolff #5-8 Heavy Duty Metric*, 12.5 coils

When cutting springs, cut one coil longer than required, then flatten both ends on belt sander about ¼ coil on each end, which results in correct length.

On Argentine and Brazilian trigger return springs – they are substantially heavier than Austrian or Belgium varieties.

Thread Pitch. Occasionally, a thread will become damaged or obstructed, and require "chasing" with a tap or die to clean it up. Here are a few of the dimensions.

Gas block interior, metric and inch	17/32 x 36
Gas tube exterior thread, metric and inch	17/32 x 36
Rear support cap, metric and inch	9/16 x 24
Commonwealth front sight	#10x40
Return spring tube cap, inside, metric and inch	¼ x 28
Front sling swivel	#8x40
StG front sight (some variations)	¼ x 20
Israeli HBAR coupler and muzzle	11/16 x 24
Belgium Long flash hider retaining screw	# 8x40tpi, , .335" long, .192" slot head.

Belgium style muzzle brake. This brake includes a few "evil" features not permitted on a post-ban gun – a bayonet notch (the law says "lug" but lets play their game anyway, just to be safe), a 22mm diameter that

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allows for rifle grenades to be attached, and a locking ring for rifle grenades (in case you had any stashed). Turn the rear of the brake down until the bayonet notch and grenade locking ring are gone. Then either turn the outer diameter down to less than 22mm (to preclude a seal with 22mm NATO grenades) or apply a bead of weld “hidden” in the 6 o’clock position to increase the diameter to where you cannot attach your stash of rifle grenade.

Sleeving flashider: An alternative to using a muzzlebrake is to use the original flashider, remove bayonet/grenade features, bore out to ½", and weld in a sleeve made from ½" DOM tubing. This looks partifularly good on L1A1 and Israeli guns, as it maintains the original profile

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LESSON 901: TEXT OF RELEVANT "RULES"

(Updated 01-15-01)

"1994 MANUFACTURE BAN"

18 USC Chapter 44 as amended by Public Law 103-322 (enacted 09-13-94)

§922(v)(1) It shall be unlawful for a person to manufacture, transfer, or possess a semiautomatic assault weapon.

(2) Paragraph (1) shall not apply to the possession or transfer of any semiautomatic assault weapon otherwise lawfully possessed under federal law on the date of enactment of this subsection (09-13-94)

§921(a)(30) The term "semiautomatic assault weapon" means

(A) any of the firearms or copies or duplicates of the firearms in any caliber, known as - . . .

(v) Fabrique National FN/FAL, FN/LAR, and FNC.

(B) a semiautomatic rifle that has the ability to accept a detachable magazine and has at least 2 of

(i) a folding or telescoping stock

(ii) a pistol grip that protrudes conspicuously beneath the action of the weapon.

(iii) a bayonet mount

(iv) a flash suppressor or threaded barrel designed to accommodate a flash suppressor

(v) a grenade launcher

"1989 IMPORT BAN"

18 USC Chapter 44 as amended by Public Law 101-647 (enacted 11-29-90) and 27 CFR part 178 as amended 06-25-93.

§ 178.39 Assembly of semiautomatic rifles or shotguns.

(a) No person shall assemble a semiautomatic rifle or any shotgun using more than 10 of the imported parts listed in paragraph (c) of this section if the assembled firearm is prohibited from importation under section 925(d)(3) as not being particularly suitable for or readily adaptable to sporting purposes.

925(d)(3) includes FN FAL (L1A1) style semiautomatic rifle with folding stock, military style stock with separate pistol grip, threaded muzzle, flash hider, grenade launcher, bayonet lug, or night sights.

Note: FN FAL (L1A1) style semiautomatic rifles having a thumbhole style stock without the above features are approved for importation.

(c) For purposes of this section, the term "imported parts" are:

(1) Frames, receivers,
(2) Barrels
(3) Barrel extensions
(4) Mounting blocks (trunions)
(5) Muzzle attachments
(6) Bolts
(7) Bolt carriers
(8) Operating rods
(9) Gas pistons
(10) Trigger housings
(11) Triggers
(12) Hammers
(13) Sears
(14) Disconnectors
(15) Buttstocks
(16) Pistol grips
(17) Forearms, handguards
(18) Magazine bodies
(19) (Magazine) Followers
(20) (Magazine) Floorplates

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GUNPLUMBER'S INTERPRETATION

The FAL does not have all of the 20 listed parts. It has no mounting block, barrel extension, operating rod or disconnector. Nevertheless, Ed Owens, former director of ATF Technology Branch, decided that a cocking handle is an operating rod. The fact that the two parts are as similar as a golf club is to a tomato does not sway him, but that's what we have to work with. So the FAL has only the following potentially "imported parts"

(1) Receiver
(2) Barrel
(3) Muzzle attachment
(4) Bolt
(5) Bolt carrier
(6) Gas piston
(7) Trigger housings *(lower receiver)*
(8) Operating rod [sic]
(9) Trigger
(10) Hammer
(11) Sear
(12) Buttstock
(13) Pistol grip
(14) Handguards
(15) Magazine body
(16) Magazine Follower
(17) Magazine Floorplate

That is 17 "evil" parts – 7 of which must be replaced with US made parts. I have examined all of the US FAL parts on the market and recommend DSA for best quality. Harold Shinn of First Son Enterprises made some good parts too, but they are no longer readily available. While replacing magazine floorplate and followers (Hesse, Enterprise, Federal Arms) for two of your US parts will be initially less expensive, I do not recommend it. First, the magazine is the weakest link in a semiauto rifle, and second, by the time you've replaced the parts in a handful of magazines, you will have reached the cost of another part that would not restrict you to converted magazines. Based on cost and availability, pick 7 of the following US parts.

hammer, trigger, sear (DSA, sold as a set only)
gas piston (DSA only)
plastic pistol grip (DSA, Hines, FSE, Century Arms)
muzzle brake (DSA, TAPCO, Entre'prise) or nothing on muzzle
cocking handle (DSA, TAPCO, Schneider)
plastic handguards (DSA)
wood stock, wood pistol grip, wood handguards (Ironwood Designs).
plastic stock (DSA, Penguin)
receiver (DSA)

There are other higher priced "exotic" parts, such a aluminum lower receivers, match barrels, and free-floating handguards to consider as well, but the above items are the most cost-effective means of compliance.

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NOTE FROM GUNPLUMBER ON SHIPPING FIREARMS
(Revised 01-15-00)

Pursuant to 18 U.S.C. 922(a)(2)(A) and 922(e), 27 CFR 178.31, a nonlicensee [no FFL] may mail a shotgun or rifle to a resident of his own State or to a licensee in any State. Handguns are not mailable by non-licensees. A handgun may be shipped dealer to dealer by USPS simply by filling out a Postal Form 1508 at time of shipping. A common or contract carrier [UPS, Fed Ex, RPS] must be used to ship a handgun. A nonlicensee may not transfer a handgun to a non licensed resident of another State. Some states like California may have additional restrictions.

Airborne Express refuses to ship any firearm or related component, claiming they cannot stop their employees from stealing.. Please join the ABNEX boycott, after expressing your dissatisfaction. UPS no longer accepts handguns for ground service, claiming they also cannot keep their employees from stealing. They will ship by next day air. The logic of segregating handguns to a special holding area where they are easily identified as handguns, to prevent their theft, escapes me.

The Postal Service recommends that long guns [rifle or shotgun] be sent by registered mail and that no marking of any kind which would indicate the nature of the contents be placed on the outside of any parcel containing firearms. A carrier must be notified that the shipment contains a firearm. In addition, Federal law prohibits common or contract carriers from requiring or causing any label to be placed on any package indicating that it contains a firearm.

ATF has determined there is no Federal requirement for a background check to return a firearm to the owner after repair or replacement from a manufacturer or gunsmith. A background check is required for a licensee to return a pawned or consignment sale firearm. NFA items may be shipped to a Class I dealer for repair with no requirement for an ATF Form 5. ATF has determined this does not constitute a "transfer" since there is no change of ownership.

The Permanent provisions of the Brady Law, in regards to the NCIS background check, have no effect on shipping a firearm to the manufacturer or dealer for repair or replacement.

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LESSON 999: SELECTED RESOURCES
(Revised 12-05-00)

ARIZONA RESPONSE SYSTEMS
5501 N 7th Avenue
Phoenix, Arizona 85013-1755
623-873-1410
http://www.arizonaresponsesystems.com
gunplumber@arizonaresponsesystems.com

FAL assembly, Customizing, refinished parts kits, misc. L1A1 and FN FAL parts, Video*: Gunplumber's Guide to FN FAL/L1A1 Home Gunsmithing,* This workbook in hardcopy with graphics. Heckler and Koch authorized refinishing center. Also customizing and refinishing. Excellent work, reasonable rates, rapid turnaround. Home of Gunplumber!

BROWNELLS, INC.
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http://www.brownells.com
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Gunsmith tools. Most extensive reseller of current production parts and accessories. Best customer service in the industry.

BUFFER TECHNOLOGIES
POB 104903
Jefferson City, MO 65110
http://www.buffertech.com

Synthetic buffer to reduce pounding of bolt carrier on receiver. Simple product, works flawlessly. I've had excellent customer service with this company, both as a consumer and as a dealer.

BUSHMASTER FIREARMS INC./QUALITY PARTS
999 Roosevelt Trail
Windham, ME 04062
1-800-998-7928
http://www.bushmaster.com

Mostly AR-15 parts, but some FAL tools and gauges

CASEY ELLIOT ENTERPRISES
414 Lincolnshire Drive.
Irving, Texas 75061
972-790-2636
http://www.angelfire.com/biz/tools4fals

FAL receiver wrench and locking shoulder sizing rods.

DEALER WAREHOUSE, THE
4813 Enterprise Way Unit K
Modesto, CA 95356
209-545-2800

Imbel receivers, unusual and hard-to-find FAL parts, especially Australian.

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DSA, INC.
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FAL parts and accessories, "SA-58" complete rifles, U.S. made receivers similar to a type I, muzzle control devices, innovative designs, excellent scope mount, US parts kits. I can't say enough nice things about the quality of these parts or guns.

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an excellent tactical sling and mounting hardware for the FAL or any other rifle.

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Excellent wood furniture for all variations of the FN FAL and L1A1.

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Military surplus FAL parts and accessories.

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