

CARBINE SHOOTING WITH ACCURACY
Including How To Deal With Some Specific Problems
February 2007

Knowing what to expect from a used USGI Caliber 30 M1 Carbine is a beginning point to shooting with acceptable accuracy. Knowing what is a reasonable expectation is also helpful to avoid overly enthusiastic demands. The starting point is that all such USGI Carbines are more than 60 years old. These Carbines have been used by military and police agencies of many countries under harsh conditions and often in combat. As needed and depending on the level of US support, the Carbines have been rebuilt any number of times with USGI parts and with foreign manufactured parts. The supply of all such parts is rapidly dwindling.

A well set up Carbine in good operating condition with good ammo will score 95-98 on the SR 200 yard Highpower center prone over a rest at 200 yards. This is simply a test of sight picture, ammo, the Carbine, and trigger pull, not the shooter's position skills. Most bullets will stay in the 10 and flyers will go into the 9.

A Carbine poorly set up or well used will not keep all its rounds inside the black of the nine and flyers will go into the 5 and 6. That is a big difference in score and a big difference in accuracy potential.

Most used USGI Carbines lie somewhere in the middle of these extremes of potential accuracy. The actual potential for any particular Carbine depends on the amount of use, the damage done by muzzle end cleaning without a guide, and the ammunition used for firing. The question remains, what considerations apply and what can be done to remedy some of them?

(1) The first real problem with Carbine accuracy is the so-so level of ammunition development. The various 1940's, 1950's, 1960's, and early LC70-72 era USGI ammos were made to go bang and cycle. None of them used accurate bullets.

The Korean PSD 80 series of ammo is far more accurate and yet will have flyers.

As a starting reference for an accurate handload of known properties, Winchester-Western published a loading for the .30 M1 Carbine using their WW296. This loading has been quite satisfactory over a long period of time. WW296 was developed specifically for loading Carbine ammunition. The Winchester WW296 loading duplicates the original USGI ammunition specifications.

The exact Winchester load is:

Powder: Winchester WW296 15.0 grains (considered maximum, do not exceed)

Bullet: Winchester 110 grain hollow soft point

Cases: WW used for data

Primers: WSR used for data

Specifications: 1980 feet per second at 36,000 C.U.P pressure in a 20" barrel. This matches the USGI velocity spec of 1970 feet per second and is well under the 40,000 C.U.P. pressure spec.

The load has been observed to function any carbine that would work with anything else. A rare few seem to not work well with any load.

Experienced handloaders have noted that the substitution of a full metal jacket round nose bullet such as Remington bulk or Sierra boxed makes no observable difference in velocity or pressure. Likewise, considering the accuracy potential of the Carbines, it has been noted that the use of other cases including mixed lots of Lake City LC, Winchester WW, Remington RP, and Korean PSD makes no observable difference in velocity, pressure, or accuracy. The ignition of WW296 when used in super cold weather may benefit from the substitution of small rifle magnum primers. Shooters rarely venture out in such cold weather that it matters.

MOST IMPORTANT: The .30 Caliber Carbine case has a maximum length of 1.290". The fired and reloaded cases should be trimmed to minimum every reloading. Reloading die makers usually specify a longish "trim to" length on the order of 1.285". The minimum length for Carbine cases is 1.280" and has been observed to be more satisfactory. This 1.280" is the normal factory length of new ammunition.

This length of 1.280" helps prevent failure to lock with the bolt forward but not rotated and subsequent out of battery firing. Too long of cases wedge the bolt forward, but do not allow easy rotation to full lock up. Too long of cases are the main cause of most problems. Carbine cases stretch at seeming random. Trim every reloading. Some cases will be unmarked by the trimmer cutter, others will be partially trimmed on one side, and others will be fully engaged with the trimmer cutter.

(The above information concerning reloading is provided as a baseline reference for those individuals who choose to reload for their Carbines. Numerous companies sell reloading manuals detailing proper reloading techniques and providing tested reloading data. Before any reloading of metallic cartridges is undertaken, the shooter must consult and thoroughly understand the reloading manuals to determine the proper techniques and procedures and to establish the safety of any loading the shooter chooses to use. The handloading of rifle cartridges should be undertaken only by those who are familiar with all safety precautions and who observe conservative practices in their reloading operations. The CMP makes no recommendations concerning reloading, has no control over the manner and means of any reloading a shooter may choose to undertake, and assumes no liability for the results obtained by anyone choosing to reload.)

(2) Ammo is only a starting point. The next effort is to control the metal in the wood and get a consistent vibration as the Carbine fires. Consistency means accuracy means hitting the same point of impact day to day and round to round in a group. The next point is a solid wood fat thick Carbine stock. Not a rebuilt to death splinter or a plastic mistake. It doesn't matter if it is USGI birch or walnut, Boyd's, or what have you, but it needs to be fat, stiff, and give something to hang on to that does not bend and flex. If the shooter is letting kids shoot it for example, it might be wise to buy and fit a Boyd's before someone ruins a WRA/GHD WHEEL stock. Common sense applies.

(3) Then the problem is of how the metal fastens to the wood. Accurate Carbines require a properly fitted barrel band and a properly fitted recoil plate. The remainder of the stock inletting rarely matters. The Carbine mechanism operates without any necessity of the stocking up system being attached. The location of the metal in the wood is controlled by the barrel band and by the recoil plate. Unless the moving slide contacts the wood or the handguard is fitted too tightly, the stock system itself usually is not a problem.

On average for easy sorting of carbines, a bayonet lug barrel band out shoots the other kinds with the least fooling around. The rebuilds with a bayonet band are accurate. The 1" wide type 2 band isn't bad, but a bayonet band is better. The type 1 skinny 1/2" wide bands are very problematic. Collectors may like them, but they cause problems with accurate shooting. They take 20 shots just to stop slipping around and find a place to stay put after every cleaning and re-assembly. Pick it up by the sling and it moves again. The tight fit of the bayonet lug barrel band covers up and cures many other problems with carbines. The skinny bands just make the other problems worse.

(4) Assuming the shooter gets a good band fit on a fat stock, the next problem is the rear end hook. The receiver just doesn't hook into the recoil plate. The recoil plate also slips under the receiver to wedge fit it in on a new recoil plate. If this wedge effect is missing or sloppy, you get both flyers and groups the size of the 6 or 7 ring even if everything else is OK. When the receiver is fitted snugly into the recoil plate, the shooter wants the tight fit to hold the barrel at the front end of the stock 1/8" to 1/4" above the stock so you have to gently pull the barrel down to fit the band on the stock nose. Start the testing with a tight recoil plate screw. Not gorilla tight, but tight as in properly snugged down and not so tight as to crush wood. How to do it?

(4a) First loosen the recoil plate screw. Set the action into the stock to center the recoil plate. Bang the butt with the hand to rattle it all around and align the recoil plate. Slip the band on over the nose of the stock. Now tighten the recoil plate screw, take the metal completely back out, and put it back in. With the

recoil plate thus tightened, if it floats, good. If it sits flat down in the barrel channel, there is more work to do.

(4b) A lot of recoil plates are worn, few people have the money to buy 10 to find one that is tighter, and as a matter of fact that is a lot of fooling around just to make it tighter. Bedding the recoil plate does not make it tighter on the receiver which is the key to accuracy. If the wood in the recoil plate area is damaged, compressed excessively, or otherwise not supporting the recoil plate firmly, bedding the recoil plate may be required. That is beyond the scope of this note. So what to do about the recoil plate fit itself?

(4c) There is a simple way to tighten the recoil plate wedge fit using whatever recoil plate that is now on the Carbine. Take the loose fitting recoil plate out of your stock. Place the recoil plate on a vise flat with the bottom of the recoil plate sitting flat on the vise flat. Identify the forward end and top edge of the recoil plate that fits up against the receiver just under the rear sight.

(4c1) Take a medium brass hammer and wallop this front edge of the recoil plate straight down. The intention is not to smash the whole thing, but to close the gap where the receiver fits in. Try it. If it is tighter, good. If not, wallop it harder and try it again. Eventually, it will float the barrel above the channel and last for a thousand rounds or so.

(4c2) The little bit of brass on the edge of the recoil plate will clean off with some Hoppe's #9 or copper remover. The original finish on the recoil plate edge is usually not damaged. Use a clean brass hammer, not one full of steel particles.

(4c3) When it floats the barrel above the normal band located position on the stock, it will shoot straight, probably.

(4c4) There is an important step in assembly of the action to the stock. After 'hanging' the action on the recoil plate, hold the stock with one hand under the receiver and strike the buttplate several times with the other. Hit it hard enough to make the slide 'clank'. The shooter can hear a different sound when it hits bottom. This is the action lug and the recoil plate coming together completely. The action will settle into position with the barrel just slightly above the barrel channel (in a properly fitted carbine), just about where the barrel band would hold it. It is incorrect and possibly damaging to pull the barrel down more than 1/8" to get the band on the stock. The Type III recoil plate is the best, but any of them can be adjusted to properly hang the action. The action 'settling' procedure is in TM 9-1276, Feb., 1953, pg. 125 & 126.

(5) The last impediment to accurate shooting is a damaged barrel at the muzzle end. A Carbine barrel will last 25,000 rounds before wearing completely out, but only maybe 10 or 20 cleanings with a jointed GI steel cleaning rod done with poor technique.

Test the muzzle. Get a USGI 30-06 M2 Ball round for a tool. Hold the carbine muzzle up and put the M2 round in point down. If the case mouth touches the barrel crown, it has been cleaned to death. You are usually out of luck although such worn muzzles often provide acceptable accuracy. If the bullet ogive holds the case mouth up a 1/16" or so above the origin of the rifling at the bore/crown interface, there is a chance of a good shooter for several thousand rounds. If the bullet holds the case mouth 2/16" above the origin of the rifling at the bore/crown interface, there is half the barrel life left. If 3/16", 3/4 the barrel life. If it holds nearly a full 4/16", it is a near new barrel.

It is easiest to measure muzzles if you simply measure 1, 2, 3, and 4/16" from the case mouth and mark those spots with a fine tip magic marker. Then it is about like using a tire tread depth gauge plunger.

A Carbine round is useless for this test as the curve of the ogive is too pronounced or too quickly rounded. The bullet will enter the muzzle and the case mouth will often sit on the crown. The long taper of the M2 30-06 round provides a good test tool.

The reason to measure from the origin of the rifling is that the crown insets the origin of the rifling a variable depth from the end of the barrel/muzzle. The end of the barrel is not a square end. Some crowning cuts are deep, some crowning cuts are shallow.

By gauging to the origin of the rifling where the bore and crown meet, you have a consistent measurement.

If the muzzle end of the bore has been "counter-bored", it is more difficult to make accuracy predictions. If the Carbine is counter-bored, take it out and shoot it. USGI Carbines were to be counter-bored at rebuild by USGI facilities. The purpose was to clean up any crown damage. Counter-boring is a normal condition in USGI Carbines. It is not a defect and was done to improve accuracy.

6) This set of fixes above ends up with a barrel that floats up against the top of the barrel band ring. This up pressure puts a constant force on the barrel and provides a constant tension on the barrel and receiver which returns the barrel to top center for a consistent vibration.

7) As an additional item, new fat stocks often have a new fat handguard. Many new handguards are so thick from the bottom up to the metal tab and from the bottom up to the wood semi-circle at the front of the handguard that they interfere with assembly. It also tends to bend and stress the barrel and stock that you have just fitted together. This thickness stress is why so many Carbine handguards have the wood semi-circle broken off the front or a half of it broken or the metal tab bent.

If the handguard mis-fits like this, then get a different one if it is a collector item. If not a collector item, place the whole handguard flat on a sheet of 100 or 150 grit sand paper. Slide the handguard around flat and sand off the bottom flat area evenly. Try it over and over until the handguard metal goes under the receiver lip and the wood semi-circle goes under the band flange without forcing it and certainly without flexing the stock and barrel. It needs to be just short of loose. Loose causes no problems compared to a tight one distorting the barrel and stock.

8) Impact Information: Carbines were assembled originally with a tall front sight that required lowering to sight in properly in most instances. The main cause of high shooting is a too much shortened front sight. It would be unusual that someone shortened the front sight so much that the adjustable slider doesn't center a group at some setting. Look at the front sight. Is the top up near the top of the holes in the wings? Or is the top of the front sight obviously way below this level like near the bottom of the front sight wing holes? If the point of impact is too low, the top of the front sight can be carefully shortened. If the point of impact is already too high, there is no easy fix beyond setting the range slider on say 100 to fire at 200 yards and so on.

At this point, rather than change the front sight height, some consideration of the impact differences of different ammunition should be made. This is because of greatly differing velocity and powder characteristics which has a considerable effect of the point of impact from any given Carbine. Put another way, perhaps a different ammunition will help zero the sights. What follows is a comparison of some rounds all using 110 grain FMJRN 0.307"-0.308" bullets with all impact data from 200 yard firing. The handload is from above.

Handload= 15.0 grains WW296 (WW296 exact WW load at USGI spec velocity)(Consider this a zero reference ammo and it is extremely accurate.)

WW2 USGI vintage ammo= (+/- 2" the same point of impact as the reference ammo because WW2 ammo was full velocity even shot 60 years later. Accuracy or rather the lack of it is on the order of two and three times the size of groups fired with the reference ammo. Spray and pray quality, but speed up to specs.)

1950's USGI ammo= (4-6-8-10" lower impact than reference ammo because Korean War ammo seems to be loaded very slowly. Remember the stories about failure to penetrate enemy clothing. Poor accuracy as with the World War II ammo.)

Vietnam War Era USGI 1970's ammo= (2-4-6" lower as it is a little slower. Moderate to poor accuracy, but the best of the USGI ammos.)

Korean military 1980's PSD headstamped ammo= (2-4" lower, but very accurate.)

1990-2007 Commercial Ammo (WW, RP, FC, and various foreign commercial ammos)= Frequently slowly loaded under USGI specification velocity. The impact points will be lower at all ranges depending on which one is purchased. (If you want to avoid the most trouble, avoid Wolf with its steel cases from Russia. It does everything from cause mis-function to disassemble extractors from the bolt face to actually break off extractors to foul chambers.)

9) Specific Problems and Potential Remedies follow:

9a) Failure to Eject/Failure to Feed: The symptoms are stove piping with a fired case trapped between the bolt face and the breech vertically, feeding a round from the magazine with the fired case still in the bolt way un-ejected, the bolt not traveling far enough to the rear to pick up a new round from the magazine, or the magazine not raising the top round for the bolt to pick up. The starting point is to always use known quality magazines. Then other causes can be evaluated.

The most likely cause in an un-cleaned Carbine removed from long term storage is that the bolt face components are stuck in place by dried oil and grease and/or fouling or the extractor and ejector springs are "dead".

Conversely, the most likely cause in a well cleaned Carbine system is that the Carbine/ammunition combination is not thrusting the gas piston back against the slide with enough force. The slide then lacks velocity and lacks inertia. That is what the big hollow U is there for in the front part of the slide. It is the inertia block. One started in reverse, it is heavy enough to keep the parts moving in reverse. The result of a weak push to the rear by the gas piston is that the bolt does not open all the way, does not travel all the way to the rear, is not open long enough to allow ejection of the spent casing, and does not go far enough to the rear to allow the magazine to raise the next loaded round in front of the bolt face.

Try these things in order going down:

*Use known quality magazines when testing a new to the shooter Carbine for function.

*When a dummy round or a fired case is cycled by hand at a moderate speed, does the extractor pull the case out of the chamber and then does the ejector smartly flip the round out the side of the receiver opening? If so, the bolt face is probably OK enough to work. If not, the small parts in the bolt face are often the problem. Or the parts are frozen in place by congealed grease and firing residue and need cleaned. Even fired cases work well for testing. **It is always considered unsafe to use a live round for function testing especially where there are function problems suspected. Firing pins are sometimes stuck in a forward position. As with any firearm at any time, point the muzzle in a safe direction in a safe location in all situations.**

*Look to see that the bolt and hammer are clean, not battered, and lightly lubricated. If the hammer is battered up, it stops the bolt which stops the slide which stops the ejection which stops the feeding.

*Degrease all of the rails, cams, grooves, and tracks in the action so that they are grease and dirt free. Then, per Army training manuals, lubricate everything with only a little bit of light lubricating oil. Or sparingly use a high quality gun grease at selected locations if the need is felt. It should be a water proof grease and not temperature sensitive.

*Make sure there is no debris in the recoil spring hole and that the guide is free of grease and dirt. Lightly oil.

*Clean and degrease the bolt face, ejector, extractor and plunger, firing pin, and bolt. Apply Hoppe's #9 well scrubbed into everything and then lubricate with a light oil.

*Different ammo- commercial ammo sometimes is so weakly loaded, that it fails to or barely operates a perfect Carbine.

*Flood the gas piston assembly from inside the bore and from outside to free up deposits. The goal is to get the piston moving freely. Hoppe's #9 works well for this purpose.

*If that cleaning fails to free the gas piston, it may be necessary to disassemble and clean the gas piston and gas piston nut and gas chamber making sure the hole up into the bottom of the barrel is open. Scratch or force nothing. Clean gently. A proper tool is required to remove and replace the gas piston nut which should then be re-staked to keep it in place. Some shooters prefer Loctite in the proper color allowing future disassembly.

*If these sorts of things don't get it running, it gets a lot more complicated and knowledgeable help may be needed. The first degree of complicated fixes is replacing all the small parts in the bolt other than the firing pin. This requires a source of new parts and a USGI bolt face tool in order to change the parts without undue effort.

*The second degree of complicated fixes is to clean and confirm the size of the hole from the barrel to the gas cylinder at being 0.070". This is a last resort. Put a junk aluminum cleaning rod down the bore so you cannot poke the far side of the bore with a finger held drill bit seeing if it will go through the hole or seeing if the hole is clean. A proper size wire bit from a machine tool supplier is needed. There is no hardware store equivalent.

9b) Check the Chamber for Parkerizing: The rebuild Carbines were often re-Parkerized with barreled actions being treated without plugging the muzzle and chamber ends of the barrel. The chamber gets Parkerized and is rough. Crud from shooting would have made it worse as more rounds were fired. What was in the barrel gets ground down and blown out in the first few test rounds.

There is an easy solution. Take a .35 or .38 brass bore brush and wrap it with 0000 steel wool. Chuck two sections of a cheap aluminum cleaning rod into a slow speed battery drill and put the rod down the muzzle female end first. Insert the bore brush into the threads of the rod from the open action end and screw it on. Coat the brush and steel wool with Hoppe's #9.

Rotate the drill slowly in the direction that the rod does not unscrew the tip and pull it into the chamber and then push it back out and pull it back in and push it back out. The idea is never to stop in one spot. It will go in and out easily while it is rotating.

Turn the drill at 1-2-3 turn per second, slowly, so that you can see it turn. In a couple hundred revolutions with a number of ins and outs, the chamber will be cleaned and polished. It will not hurt the steel chamber or the throat of the chamber.

9c) Magazines: Mixed into the foregoing mechanical problems with the Carbine itself, is the ever present issue of magazine quality and condition. As with any other detachable magazine fed firearm, the feed lips need to be parallel and properly shaped, the body cannot be dented, and the spring needs sufficient force to lift the column of cartridges fast enough to catch the top round in front of the bolt. The inside of the magazine needs to be clean and free of debris, grease, and oil beyond the most thin coating.

USGI 15 round magazines are the most dependable commonly available Carbine magazines. Each of the World War II era magazines was marked with its maker's identification letters on the lower back side of the magazine. There were many such makers. When new or in near new condition, these 15 round magazines tend to function well as long as the spring has enough force to raise the column of cartridges. All such original USGI 15 round magazines were blued when made. Any such magazine

now found Parkerized has been refinished. The follower has no hold open feature at the rear to catch the bolt open when the last cartridge is fired.

USGI 30 round magazines are also dependable. When new or in near new condition, these 30 round magazines tend to function well as long as the spring has enough force to raise the column of cartridges. USGI 30 round magazines were blued when made. Any such magazine now found Parkerized has been refinished. The follower has a flat on the rear to catch the bolt open when the last cartridge is fired. USGI 30 round magazines are becoming scarce and rarely found in new condition. Magazines will bear makers identifications such as SEY, A.I., J, and I. Magazines marked AYP and NVS are military quality magazines made respectively by FN for Belgium and Holland and by a Japanese maker for the Japanese military.

Aftermarket or commercial 30 round magazines vary from dependable to nearly useless. Few generalizations are possible about these magazines. Magazines marked M2 and USA are both aftermarket makers of varying quality. It should be noted that counterfeit SEY and AYP marked magazines are being made by commercial makers. They are simply commercial magazines with misleading marks on them.

With both 15 and 30 round magazines, re-assembly is often problematic. The springs are a VVV pattern of different lengths for the short or long magazines. When reassembling them after cleaning, the terminal or long end of the VVV goes under the rear of the follower. This places the most lift at the rear of the cartridge column to help it raise the top rim in front of the bolt. If reversed, the last few rounds tend not to feed correctly with the bolt over-riding the top round.

Testing a Carbine should be done with the best possible magazines. Worn or damaged ones will cause all sorts of symptoms that appear to be the mechanical problems mentioned above.

The first and most important check of a Carbine magazine is to look at the locking lugs on the rear of the magazine that are engaged by the magazine catch. The shooter should observe if the lugs are full and undamaged or if they are chewed up. If perfectly square and undamaged they are probably OK. If they are chewed up, they may well cause problems. Damaged lugs allow the magazine to lock in place lower in the magazine well in relation to the bottom of the bolt face. A positive check can be made to see if the distance from the bottom of the two locking lugs in the back of the magazine to the top of the feed lips at the rear of the magazine measures 1.50" or more. A micrometer is needed to measure the distance. It is simply hooked under the lugs and over the top of the rear of the feed lips. If the lug to lip measurement is less than 1.50" feed problems will be encountered.

The 15 round magazines only have two lugs at the rear. The original magazine catch only had two points of contact to match these two lugs. The 30 round magazines have the same two lugs plus a side lug on the left for a third engaging point. Later version magazine catches have a wing on the left side of the catch to engage the third lug on the left side of the magazine tube. This helps support the heavier and longer 30 round magazines. Some 5 round magazines made from 30 round tubes have the same three lugs and a hold open follower.

10) Stocks and Handguards: As to stock and handguard considerations, feel free to consult the CMP Wood Care Tips Site @

http://www.odcmp.com/Services/Rifles/wood_cleaning_article.htm

10) Good luck.