The Study of Gunsmithing



Sonoran Desert Institute

MODULE NUMBER 3

Troubleshooting Firearms



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MODULE NUMBER 3

Troubleshooting Firearms

2174 Troubleshooting Rimfire Rifles

2175 Troubleshooting Centerfire Rifles

2176 Troubleshooting Shotguns

2177 Troubleshooting Handguns

2178 Converting Military Rifles to Sport

2490 Basic Hand Tools Lab (#)

(#) Indicates point in your program at which additional lesson materials will be sent as you complete and return the lesson exams for grading.

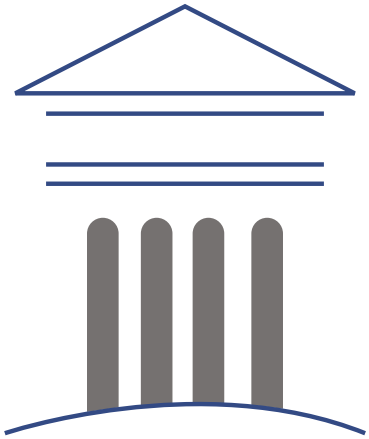
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Troubleshooting Rimfire Rifles Lesson: 2174

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Objectives

After completing this lesson, you should

1. Know what type of illustration is most helpful for troubleshooting.
2. Be familiar with the causes of misfires in .22 rimfire rifles.
3. Know the effect of repeatedly firing .22 shorts in a .22 Long Rifle barrel.
4. Understand why you should not dry fire a rimfire rifle.
5. Know how to remove burrs from a rimfire rifle chamber.

Introduction

The term "troubleshooting" as used in this course covers the investigation, analysis, and corrective action required to eliminate faults in the operation of firearms. Most troubles are simple and are easily corrected. Some simple troubles are misfeeding caused by dirty action parts, gummed-up parts caused by excessive lubrication, and malfunctions caused by worn or broken parts.

The many troubleshooting charts found in the next several lessons give steps for correcting problems in firearms of all types. The charts are also meant to stimulate a train of thought and indicate a work procedure directed toward the source of trouble. To use them, find the malfunction on the left side of the charts, then read across to the right for probable causes. Continue across to the right for the proper corrective action.

Think before acting. Study the problem thoroughly, then ask yourself the following questions:

- What were the warning signs preceding the trouble?
- What previous repair and maintenance work has been done?
- Has similar trouble occurred before?
- If the firearm still shoots, is it safe to continue shooting it before further testing?

The answers to these questions can usually be obtained by the following methods:

- Questioning the owner, if the firearm belongs to someone else.
- Taking time to think the problem through.
- Looking for additional symptoms.
- Consulting the troubleshooting charts; checking the simplest things first.
- Checking the parts in the gun against the parts pictured in the exploded views or parts list available from the manufacturer.
- Checking with gauges and calibrated instruments.
- Double-checking all conclusions before disassembling the gun or components.

The source of many problems can be traced not to one part alone but to the relationship of one part with another. For instance, improper feeding in a tubular- magazine rifle might not be caused by a weak magazine tube spring, but by a dented tube that prevents the spring from functioning properly. Too often, firearms are completely disassembled in the search for the cause of a problem and all evidence is destroyed during disassembly. Be certain that you have not overlooked an easy solution.

After you correct a mechanical failure in any firearm, be sure to analyze what caused it so that the same failure will not be repeated. For instance, if you replace a broken extractor in a gun that failed to extract a cartridge from the chamber, try to figure out what caused that extractor to break in the first place. Your investigation may reveal that a corroded chamber caused extremely hard extraction, which eventually broke the extractor. Careful polishing of the chamber would prevent the extractor from breaking again in the near future.

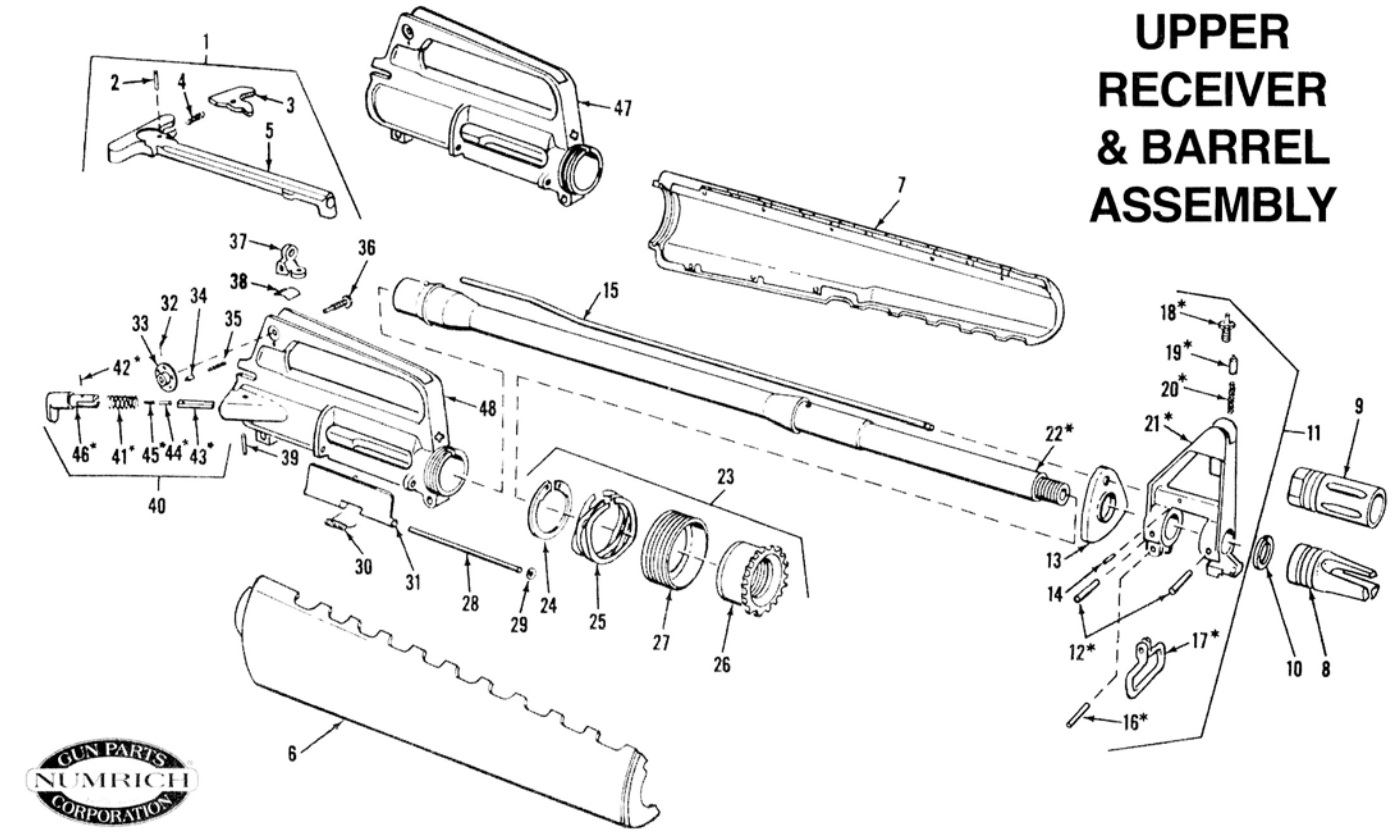


Figure 1: *An exploded view of a firearm (available from the firearm's manufacturer) greatly simplifies the assembly or disassembly process. Parts numbers, like those shown in this illustration, are used to label each part for easy identification. Study an exploded view carefully before loosening the first screw to make sure you understand each part's purpose.*

Firearm Repair

A common problem among gun owners is the inability to reassemble a firearm correctly once it has been dis- assembled. Many professional gunsmiths have had to reassemble a customer's gun that was brought into the shop in paper bags and cigar boxes after the customer tried to "fix it up a bit" or thoroughly clean it. The customer probably had little trouble getting the gun apart, but putting it back together in the proper sequence was another matter. To compound the situation, some of the parts may be missing, screw heads may be badly marred, or some parts may be damaged beyond repair due to use of improper tools and/or procedures during disassembly. In fact, many professional gunsmiths make a good living from correcting amateurs' mistakes.

Exploded views like Figure 1, supplemental drawings like Figure 2, and extensive explanations of how guns are disassembled and assembled help eliminate many of the problems. However, this material will not automatically make a professional gunsmith out of anyone. Some of the operations described should be done only by a professional who has the proper tools and experience. Also be aware that although troubleshooting charts and procedures greatly help in diagnosing malfunctions, they can never be complete. There are too many variations of a given problem. To solve problems consistently, you must first understand the basic parts of all types of firearms, how they function, and for what purpose. If you know that a particular part is not performing its job, then you know that the cause of the malfunction must be within this part or related series of parts.



Figure 2: *A detailed supplemental drawing showing how the finger-lever pin is driven out of a Winchester Model 94 lever-action rifle.*

VISUAL INSPECTION

After you disassemble a firearm and thoroughly clean all its parts, carefully examine the internal parts for wear. Once all parts are clean, examine the bore with a bore light. Is the barrel pitted? Should it be lapped, relined, or rebored? What is the general condition of the rifling or shotgun bore and other parts? Examine each smaller part under a magnifying glass. Look for hairline cracks, obvious breaks, and excessive wear. If any are found, now is the time to replace or repair the part—before you or your customer has lined up a big trophy animal and the gun fails.

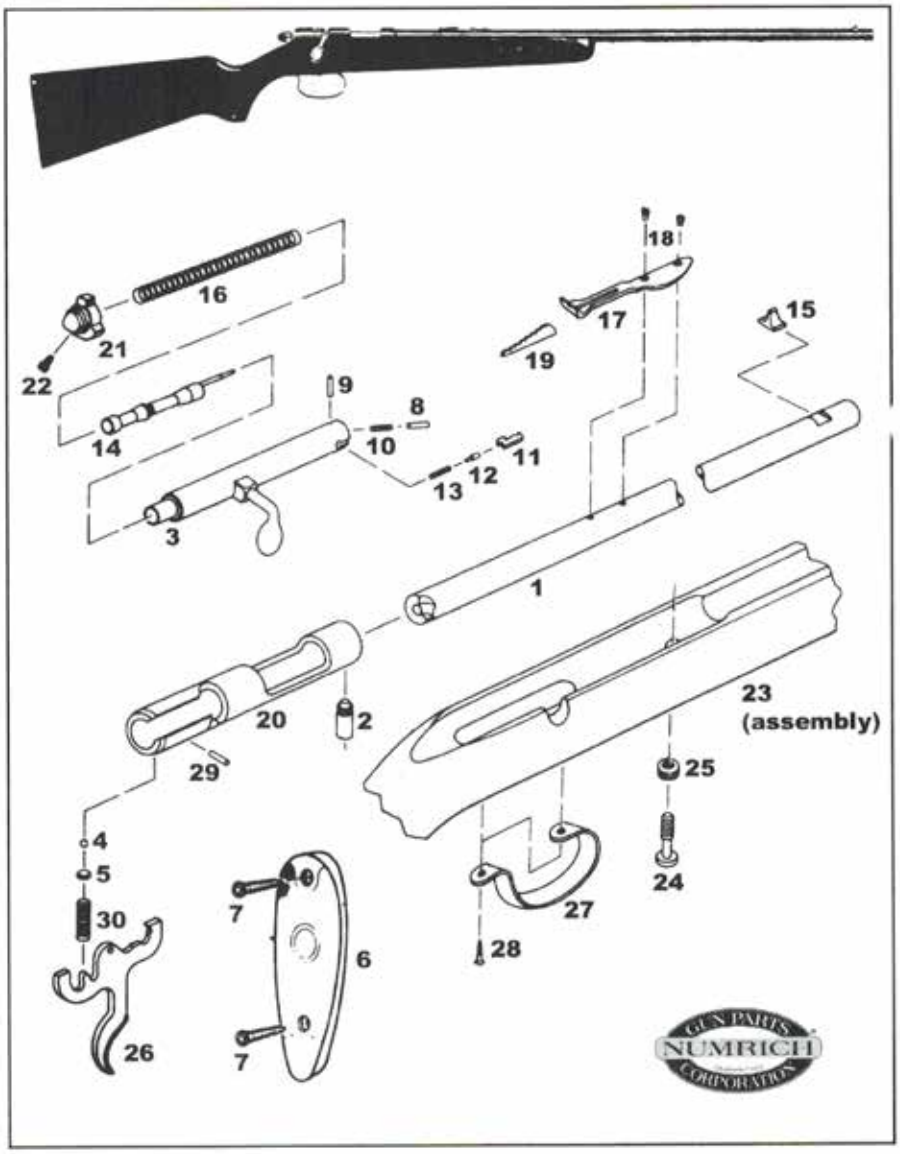
TROUBLESHOOTING

Most firearms manufactured in the United States are designed and built to last a lifetime, but all of them are subject to certain common malfunctions. Worn and broken parts will need to be replaced, trigger assemblies will need adjusting, headspace will need correcting, worn finishes will need to be renewed, and a host of other adjustments will need to be made. In every case, before a gun can be repaired, you must determine the problem. Then you must follow a definite plan to do the actual repair. Finding out exactly what is wrong with a malfunctioning gun is known as troubleshooting, and troubleshooting rimfire rifles is what this lesson is all about.

Remington® MODEL 514

.22 S, L, AND LR SINGLE SHOT RIFLE

KEY#	MFR#	ITEM#	DESCRIPTION	PRICE
1	-	128240	Barrel, 23-1/2", Replacement, Blue	48.10
2	17231	76190	Barrel Lock Screw	2.25
3	22750	76240	Bolt Body w/ Handle	60.20
-	22745	76270	Bolt Assembly	90.35
4	23222	87690B	Bolt Detent Ball	6.40
5	17981	76350	Bolt Detent Retainer	2.25
6	17578	83480G	Buttplate, Replacement	15.45
7	25410	1234740	Buttplate Screw, Original (2 Req'd)	3.30 ea
7	18778	148770BL	Buttplate Screw, Replacement (2 Req'd)	3.30 ea
8	17239	76480	Ejector	6.10
9	17676	85680G	Ejector Pin	6.40
10	17572	384620Q	Ejector Spring	2.25
11	17238	76600	Extractor (Fitting Req'd)	10.25
12	17576	85600A	Extractor Spring Plunger	3.50
13	17573	174100D	Extractor Spring	4.40
14	17704	76680	Firing Pin	22.80
15	21075	76720	Front Sight	10.60
16	17244	76740	Mainspring	4.90
17	17229	87220D	Open Sight Leaf, Two Screw Type (Screws Not Included)	9.25
18	17570	92980D	Open Sight Screw (2 Req'd)	6.55 ea
19	28095	87450E	Open Sight Step	3.40
21	19302	76960	Safety	16.70
21	-	955370	Safety, Plastic, Replacement	18.50
22	17246	76990	Safety Screw	2.25
23	-	77020	Stock w/ Buttplate, Used, Original	84.95
-	18593	815970C	Stock Swivel Screw, NI (2 Req'd)	3.20 ea
24	17568	79740	Takedown Screw	2.45
25	17569	82050F	Takedown Screw Escutcheon	9.20
26	19305	79830	Trigger	7.65
27	15871	82740R	Trigger Guard w/ Two Screws, Replacement	14.95
28	17577	82360C	Trigger Guard Screw (2 Req'd)	2.35 ea
29	17676	85680D	Trigger Pin	6.40
30	17234	80020	Trigger Spring	2.35



NI = NOT ILLUSTRATED

Figure 3: An exploded view of a bolt from a Remington Model 514 bolt-action rifle.

Single-Shot Rimfire Rifles

COMMON MALFUNCTIONS

There is really very little that can go wrong with most .22-caliber single-shot bolt-action rifles, but these rifles are still subject to certain common malfunctions. The most prevalent of these malfunctions are failure to fire, failure to extract, failure to eject, and inoperative safeties. On rare occasions, the gun may fire when the bolt closes. These guns are also subject to leading — the same as any other weapon that fires lead bullets — and most inexpensive .22s have creepy, heavy triggers that could use a little work.

Due to the simplicity of most .22-caliber single-shot rifles, this gun is good for the beginner who is learning about trouble-shooting techniques and firearm repairs. You can get a quick overview of the common problems and how to repair them. Furthermore, you can use these techniques on the more complicated designs that you will encounter in the future.

Failure to Fire. The chief cause of misfires in .22- caliber guns is a broken or damaged firing pin. This problem is often caused by repeatedly snapping the gun on an empty chamber, a practice that should obviously be avoided. If the striker or firing pin must be lowered when the chamber is empty, hold the trigger back while closing the bolt and turning down the handle. This will ease the striker down gently.

When a gun will not fire, examine the cartridge that was chambered when the trigger was snapped. If the fired cartridge shows no mark on the rim, then the cause is most likely a broken firing pin — especially if you hear a distinct snap of the striker when the trigger is pulled. On the other hand, if the cartridge has a slight indentation or if you do not hear a definite snap when the trigger is pulled, chances are the problem is caused by a broken or weak firing pin spring.

In either case, you should disassemble the bolt and inspect the mechanism. This procedure involves unscrewing the safety screw (cocking knob) and knocking out various straight pins which hold the extractor, cartridge guide, firing pin, etc. in place. Figure 3 is an example of an exploded drawing of a bolt. Such a drawing will be a big help when you are ready to reassemble the bolt. If an exploded drawing is not available, make notes and simple drawings when you take the bolt apart. This will keep you on the right track when you put the parts back in place.

Be careful not to lose the parts. Keep all small parts to each section of a firearm in separate plastic drawers or self-sealing plastic bags. If it's going to be awhile before the parts are reassembled, mark each drawer or bag with appropriate notes for identification.

Once the bolt is disassembled and you find that the firing pin is broken, you will need to either repair or replace the pin. A factory replacement is always best; however, if the gun is obsolete and parts are not readily available, you may have to repair the old pin. A new pin can be made from flat stock and welded on, but it must be heat-hardened or it will wear and break quickly.

If you have the time, you can make entire firing pins in your shop from drill rod and/or flat stock. This can be done with a small lathe, or you can turn the firing pin by clamping the stock in a small ¼" drill (held in a vise) and letting the metal stock rotate against a flat file. Use the old pin as a guide and check the dimensions frequently. A firing pin that is too long may fire the gun when the bolt closes; one that is too short will result in misfires.

If the firing pin is not broken, the second most common cause of misfires is a weak or broken firing pin spring. Sometimes part of a spring may have been broken and the owner may have stretched it enough to make it function. However, this stretched tension will not last. The only sure solution is to replace the spring. When you get a new spring from the factory, it will be longer than the replaced one because it takes awhile to set. Before long, though, the new spring will fit as well as the old one.

If neither the firing pin nor the firing pin spring is damaged or weak, the most logical remaining cause of misfiring is debris inside the bolt. In subfreezing temperatures a small amount of grease inside the bolt can gum up the entire works. Only a light coat of thin gun oil should be used in moderately cold climates, and in subzero temperatures the gun should be completely free of any oil or grease. You can remove oil or grease with a degreaser.

To clean grease and debris from the bolt assembly under normal conditions, you will need a container large enough to hold the parts and also a good cleaning/degreaser solution. The ratio should be about four parts water to one part cleaning solution. The dirtiest parts, if left to soak in this solution for 15-20 minutes, will come out clean and ready to dry, oil, and assemble.

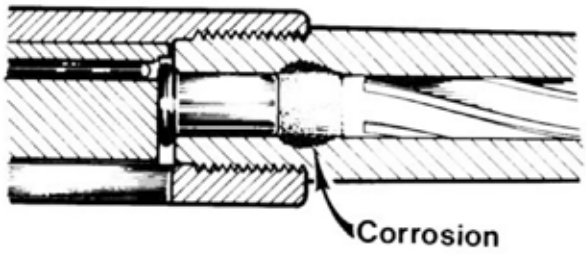


Figure 4: Corrosion in a .22-caliber rifle chamber caused by the frequent firing of .22 shorts in a rifle chambered for the .22 Long Rifle cartridge.

You can help the process by scrubbing the parts with a soft toothbrush after they have soaked for about 10 minutes.

Remember that you can often correct many malfunctions simply by cleaning the firearm thoroughly. Grease and the assorted debris it attracts can gum up any part to the point that it functions poorly. This is especially true in semi-automatic guns. Make it a habit to clean every firearm thoroughly before troubleshooting malfunctions or making repairs. Even if the trouble is due to worn, broken, or damaged parts, you will be able to spot the trouble more quickly if these parts are clean.

Failure to Extract. An extractor withdraws fired cases from the chamber and, in the case of magazine rifles, guides each live round of ammunition into the chamber as it is stripped from the magazine. Worn, broken, and missing extractors are common problems with .22-caliber single-shot bolt-action rifles. Installing a new extractor may not always solve the problem. For example, .22 rifle chambers can become extensively corroded by frequent firing of .22 shorts in a gun chambered for the .22 Long Rifle cartridge (Figure 4). Then when .22 Long Rifle cartridges are fired, the longer cases swell into the corroded area, making extraction difficult. Extractors are under a great deal of strain in normal circumstances. Under this additional strain, the extractor wears quickly, slipping over the case rim when the bolt is withdrawn. A new extractor will help for a while, but the problem will recur in time.

If the extractor is worn due to a dirty bore, a thorough cleaning and new extractor will usually solve the problem. If the extractor is not worn too badly, the angle of the hook can sometimes be corrected by light honing.

When extraction is a problem, first check the chamber of the weapon (after cleaning) and look for tool marks and pits. If either are present, smooth the chamber as best as possible using a very fine emery cloth and then polish it with a crocus cloth. A hardwood dowel turned to the approximate shape of the chamber, and of a diameter so that one thickness of abrasive paper wrapped around the rod will fit snugly into the chamber, should be used for polishing. Just be sure not to enlarge the chamber so much that it will be too big for the cartridges.

Now try some new cases for extraction. If the problem has not been corrected with the polishing, a new extractor will have to be installed or the old one honed to the proper angle to make it serviceable. Also check the extractor spring. Replace the spring if it is worn or broken.

Failure to Eject. The ejector flips the cartridge from the extractor's grip at the proper instant. Therefore, the extractor and the ejector work as a team, and a problem with one could cause a problem with the other. For example, if the extractor is worn or damaged, it can prevent the ejector from working. If the extractor is loose, it can prevent the ejector from throwing the spent cartridge away from the gun.

If you encounter an ejection problem, first check for dirt and foreign matter which could be blocking the ejector, preventing it from functioning properly. A broken or worn ejector is easily recognized and must be replaced. If you cannot find anything wrong with either the extractor or the ejector, but the gun still does not eject properly, check the pin holding the ejector in the bolt. It may be bent or burred, thus preventing the ejector from moving freely.

Inoperative Safeties. Safeties on .22-caliber single- shot bolt-action rifles vary considerably. The Winchester Model 69, for example, uses the cocking piece as a safety. In other words, the bolt does not cock on opening or closing, but must be cocked by pulling back on the cocking piece so that the trigger sear engages and holds in a cocked position until the trigger is pulled. Other rifles must be cocked in a similar manner, but many also have a rotary safety screw. Some rifles cock upon closing the bolt and have either a safety screw on the bolt or a button safety along the side of the action.

The Mossberg Model 320K has a safety that goes on automatically when the action is opened and will not fire until the action is locked and the safety is in the off position. Some of the early .22s utilized a simple slide- type safety that, when on, blocked the trigger with a thin piece of flat metal. However, some of these models fired with the safety on if enough pressure was exerted on the trigger. Some of them would go off quite easily and were certainly not safe.

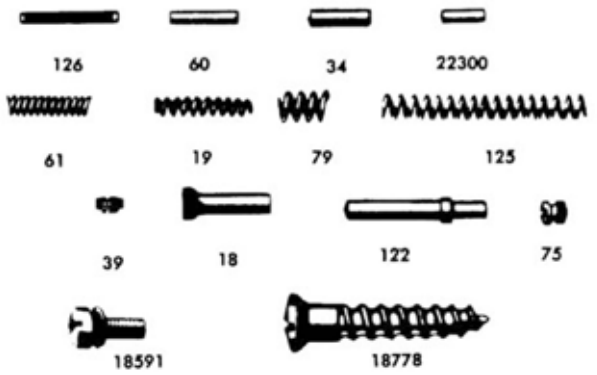


Figure 5: Replacement spring kits are available from gunsmith supply houses, but if you only need one or two springs, order an exact replacement from either the manufacturer or gun part supply house.

In most cases, if the existing safety is inoperative, it's best to order a new safety assembly from the manufacturer. When this is impossible (if the weapon is obsolete), you can make a new safety or modify an available one. Once you understand the action of a safety for a particular weapon, repairing it should not be difficult. In all cases, the safety either prevents the trigger from being pulled or prevents the firing pin from moving forward. On most .22s the safety prevents the trigger from being pulled.

Trigger Repairs. Since many .22-caliber single-shot bolt-action rifles are designed to be built as inexpensively as possible (except for a few high-grade target rifles), most have creepy, heavy triggers, which are powered by an inadequate spring arrangement. These trigger assemblies use an inverted L-shaped protrusion on the trigger that acts as a sear. This protrusion bears against a notch or sear in the firing pin or striker. When the trigger is squeezed back against the spring pressure, the L-shaped extension disengages from the firing pin notch, permitting the mainspring to drive the firing pin forward to discharge the gun.

All types of springs are found in trigger mechanisms for the various .22 rifles, and all can break after much use. Most can be replaced from packaged spring assortments sold by gunsmiths' supply houses. Helical and similar springs can be made from music-wire spring stock. Common sizes run from .020 inch to .045 inch. Flat springs can be made from flat-spring stock, but they will have to be retempered. If you only need one or two springs, order a replacement from the manufacturer (Figure 5).

Trigger mechanisms on some inexpensive single-shot .22 rifles malfunction because of interference from the wooden stock. For example, the Winchester Model 60A single-shot rifle uses a pin through the stock on which the trigger pivots, and gets its "spring" from a flat spring applying pressure to a feeding/sear part.

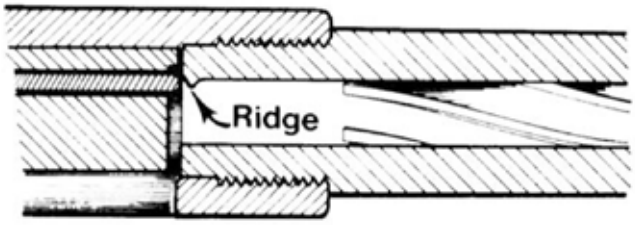


Figure 6: Dry firing any .22 rimfire rifle can force a ridge of metal into the chamber.

It is difficult to lighten the trigger pulls on most single- shot .22 rifles because of the stiff springs that must be used to provide positive cocking. Improvements can be made; however, by honing all contact points smooth, then polishing. The springs on some of these guns can be lightened slightly, which in turn will lighten the trigger pull. Proceed in this direction with caution and have a replacement spring on hand in case of an error.

Correcting Burred Chambers. Dry firing any .22 rifle can break the firing pin or also force a ridge of metal into the chamber, as shown in Figure 6. This ridge can cause feeding and extraction problems. Since the bolt may not close completely, headspace can be a problem, leading to non-ignition or a ruptured case.

If you are careful, you can use a small bastard file to remove the burr, but file only the ridge and do not touch any other portion of the chamber.

A safer way to remove the burr is to make a .22-caliber ironing tool like the one shown in Figure 7. To use it, slide the tool into the chamber, using only moderate force, and rotate it. The flat blade side pushes the extruded metal back into position without any loss of chamber surface or change in dimensions.



Figure 7: A .22-caliber ironing tool for removing burrs in chambers. To use, slide the tool into the chamber, using moderate force, and rotate it. The flat blade slide pushes the burrs back into position.

TROUBLESHOOTING CHART
.22-Caliber Rimfire Single-Shot Rifles

Malfunction	Probable Cause	Corrective Action
Bolt closes hard	Rough chamber	Polish lightly
	Rough cam in receiver	Smooth up cam
	Too little headspace	Adjust headspace
	Damaged extractor cut	Correct damage
Bolt follows down (does not cock)	Engagement of sear to connector locking or insufficient to hold	Adjust
	Trigger fails to retract	Adjust
	Damaged sear	Replace sear
	Connector damaged	Replace
	Sear and connector dirty	Clean
Fails to extract	Extractor damaged	Replace
	Faulty extractor grips	Adjust
	Extractor slot in barrel damaged	Repair slot or replace barrel
	Rough chamber	Polish lightly
	Fired cartridge bulged at base	Check headspace
Misfires	Fired cartridge bulged at mouth	Polish chamber or replace barrel
	Firing pin worn or broken	Replace
	Firing pin binds	Free up and clean
	Trigger assembly faulty	Adjust
	Mainspring damaged	Replace
Fails to eject	Ammo faulty	Discard ammo
	Damaged ejector	Replace or tighten
	Loose cartridge under extractor	Adjust grip on extractor
Poor accuracy	Bolt-stop release damaged	Replace bolt-stop spring
	Bolt stop binds	Remove burrs and clean
	Barrel crooked	Replace or straighten
	Barrel bore or muzzle damaged	Replace barrel
	Faulty sights	Adjust or replace

Figure 8: *Troubleshooting chart for .22-caliber single-shot rifles.*

Damaged Muzzles. Occasionally, you will run across a .22 rifle that does not shoot accurately even though the rifling appears to be in excellent condition and the action and related mechanism are tight and functioning properly. It is possible that rifling at the crown of the muzzle has become burred due to some sharp object striking it. Use a magnifying glass to inspect this area.

The best solution to burred muzzles is to re-crown the barrel, cutting the barrel back about $^1/_8$ inch. Use a lathe, if one is available. Chuck the barrel in the lathe headstock and use a dial indicator or other gauge to make sure the barrel runs true. Then, using a barrel crowning lathe bit, take careful cuts until the proper degree of crown is cut.

You can also solve the crowning problem by using a muzzle crowning ball in either a hand or electric drill. For badly damaged muzzles, you can use a rotary file first to start the crown cut, and then use a brass ball for lapping and finishing. Coarse and fine muzzle crowning rotary files are available in diameters of $^3/_8$ inch, ½ inch, and $^5/_8$ inch. The muzzle-crowning brass balls are available in $^7/_{16}$ inch, $^9/_{16}$ inch, and $^{11}/_{16}$ inch.

Repairing Sights. Sights on the inexpensive .22- caliber rifles usually consist of conventional dovetail front sight blades and ramp-type rear sights. The elevation is controlled by the rear sight and the windage is corrected by the front sight. The only problem with these sights is losing them; the rear sight elevator

can get knocked out and be lost or the shoulders of the dovetail slot can become loose, allowing the sight base to slip out.

If you notice loose sight bases, you can correct the problem in either of two ways. Peen in the shoulders of the dovetail slot until they are tight against the sight base. Or remove the sight and, using a center punch, punch a series of craters in the bottom of the slot. The raised metal will tighten against the bottom of the sight base.

The troubleshooting chart in Figure 8 summarizes most of the problems and solutions of .22-caliber single-shot bolt-action rifles.

SELF-TEST QUESTIONS

Please check your answers on page 27.

1. **After you correct a mechanical failure in any firearm, what should you do to ensure that the trouble will not recur?**
2. **What is the chief cause of a .22 single-shot rifle misfiring?**
3. **What is one probable cause of a .22 rimfire rifle failing to extract the fired cartridge?**
4. **What is the chief cause of a burred chamber in a .22 rimfire rifle?**

Repeating Rimfire Rifles

SLIDE-ACTION RIMFIRE RIFLES

You may prefer to call them pump- or trombone-action rifles, but by whatever name, .22 rimfire slide-action rifles have been popular with American shooters since Winchester introduced their famous Model 1890 rifle. In fact, the pump-action rifle was probably the most popular .22 rifle in existence until the past couple of decades, when semi-automatics started to take over.

Due to their simplicity, few .22 pump-action rifles will ever need any major repairs. When a malfunction does occur in a .22 pump-action rifle, it will be similar to the malfunctions described earlier for .22 single-shot, bolt-action rifles. Since .22 pump-action rifles are repeaters, in addition to the common malfunctions, you might run across feeding problems caused by dents or debris in the magazine tube; worn or broken magazine springs; bent, broken, or blocked cartridge stops and cutoffs; or worn carriers or carrier cams. Refer to Figure 9 as you review the following information.

Common Malfunctions. Burred or scratched chambers and peened muzzles are quite common. Since pump-action rifles are repeaters, they are especially prone to hang-up because of hardened grease and foreign matter in the receiver and extractor recesses. This problem is compounded by the lubricated ammunition used by most shooters and by the comparatively small size of the various action recesses.

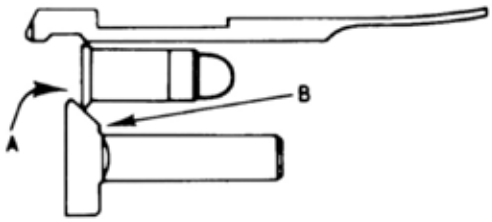


Figure 9: *A sectional view of a cartridge stop in the Remington Model 121.*

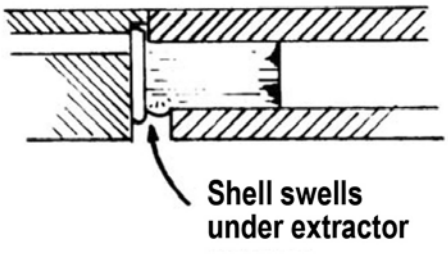


Figure 10: When the extractor clearance cut in the barrel is too deep, cartridges will swell under the extractor, causing it to slip off the rim of the cartridge case.

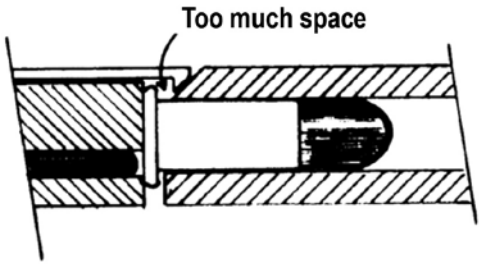


Figure 11: Too much space between the claw and the face of the breechblock may prevent fired cartridges from ejecting.

Faulty extraction and ejection are most often related to badly fouled or burred chambers (usually caused by dry firing) or by jammed extractor springs.

Many problems associated with .22 pump-action rifles can be solved by a thorough cleaning and degreasing, so make this operation your first before beginning any diagnosis or repair work. Strip the gun down to its basic action components and clean and degrease them thoroughly. Once the parts are clean, those requiring replacement or touching up are fairly easy to detect.

FAILURE TO FEED. Most .22-caliber pump-action rifles have tubular magazines, which are subject to denting, in turn causing misfeeding. Therefore, when a pump- action rifle has feeding problems, first check over the magazine tube for dents, rust, or corrosion. You should be able to see dents easily after thoroughly cleaning the tube. You can remove dents by inserting a steel rod of near-tube diameter into the magazine, then hammering the dented area with a brass hammer over a piece of leather. Light taps around the dented area will raise the dented metal. Rusted or corroded magazine tubes can be corrected by cleaning.

A weak, rusted, or badly bent magazine spring can also cause feeding problems. A weak spring can usually be diagnosed and temporarily corrected by stretching it or by inserting a small wooden dowel in the spring compartment to compress the spring more. You will need to install a new spring to replace the weak one.

Sometimes the cartridge stop will catch the cartridges at the front end of its incline. You can correct this problem by reducing the bevel at the lower front end of the cartridge stop. Refer to Figure 9 as you read about this process. If cartridges do not feed up the incline of the cartridge stop, but catch on comer B, you should cut the beveled surface lower at B and taper it to A before polishing it. If the cartridges do not feed through the action bar, remove the cartridge stop and grind off only enough metal at point A to allow the shell head to pass over.

If feeding fails from the action bar to the breechblock guideways, the lug of the breechblock has been cut away too much at its incline (where the action bar engages) to move the block forward. This allows the action bar to move cartridges too far forward in relation to the breechblock. Since it is very difficult to replace removed metal, a new breechblock should be fitted if this is the problem.

If the failure is from the bottom of the breechblock to the barrel, check the guideways in the face of the breechblock. They are probably too wide, allowing the cartridge head to fall out. The solution is to fit a new breechblock.

Another cause for this problem is if the firing pin is held too far forward by the ejector spring, causing the shell head to catch on the bottom of the firing pin point. Bend the ejector spring front prong slightly toward the rear of the rifle. This should correct the problem.

Extraction and Ejection Problems. The most likely cause of faulty extraction in .22 pump-action rifles is either a dull extractor claw or a weak extractor spring. The former problem can be corrected in most instances by sharpening the claw. The latter problem is corrected by replacing the weak or broken spring.

At times, the extractor clearance cut in the barrel is too deep, as shown in Figure 10, allowing shells to swell under the extractor and causing them to slip off the rim of the cartridge cases. Fitting a new barrel is the best solution, although the extractor slot can be built up and recut.

Dry firing a .22 rimfire rifle can cause a ridge or heavy burr to protrude into the chamber, as was shown earlier in Figure 6. If such a burr is present, ream out the burr from the chamber or it will hinder, or possibly prevent, extraction. As discussed previously, the .22-caliber ironing tool will work most of the time, but the problem may require the use of a chambering reamer.

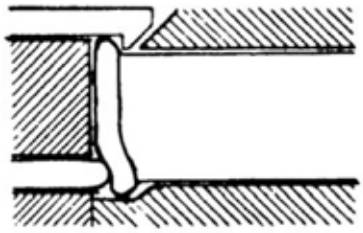


Figure 12: The cartridge-supporting surface at the end of the barrel where the firing pin strikes can be out of position, causing the cartridge rim to bend upon firing and fail to ignite.

If the extractor has too much space between the claw and the face of the breechblock, the spent cartridge might not eject (Figure 11). The extractor lug can sometimes be bent to shorten the space at the claw.

Action Failures. If the action fails to release when fired, the carrier probably does not rise high enough at the front end to clear the carrier dog. To remedy this, adjust the mainspring rod by bending its middle slightly down at the point where it engages with the rear of the carrier.

Action Fails to Lock Forward When Arm Is Cocked. This problem is just the opposite of the one above; it is caused by the carrier not going down far enough at the front end to engage properly with the carrier dog. Remove the carrier and cut away some metal from the carrier where it rests at the front end of the guard.

Also check for rounded corners on the carrier where it engages with the carrier dog. If it has rounded corners, a new carrier will have to be fitted. By the same token, check for rounded corners on the carrier dog, and replace it if necessary. Finally, inspect the carrier dog spring and replace it if it is weak or broken.

Breechblock Starts Forward Hard. Inspect the gun to see if the recoil lug of the breechblock is catching on the well hole in the rear top of the receiver, which, on some rifles, is slightly rounded at the corner. If so, peen the metal of the receiver to make the front corner of the well hole reach farther toward the rear or fit a new breechbolt.

Carrier Fails to Lift Cartridges When Action is Moved Forward. The most probable cause of this malfunction is a weak or broken carrier dog spring, which should be replaced if found defective. The carrier dog itself may be the culprit. If it is badly worn or broken, refit a new one.

Cartridge Strikes Edge of Chamber. If this problem occurs, first thoroughly clean the rifle; dirt under the extractor is probably preventing the extractor from swinging far enough toward the cartridge. Once the rifle is clean, check the space between the extractor claw and the face of the breechblock. If there is too much space, bend the lug of the extractor forward to shorten the distance. A dirty or gummed-up extractor spring could be causing the problem; if so, the initial cleaning should solve this problem. If it does not, check for a weak or broken spring and replace if necessary.

FAILURE TO FIRE. On pumping the action, sometimes the hammer will not stay cocked. This is probably caused by a broken hammer notch. Disassemble, check the hammer, and replace it if necessary.

Continue the check by looking for broken or worn firing pins, mainspring, etc. Replace all broken or worn parts.

The cartridge-supporting surface at the end of the barrel where the firing pin strikes can be out of position, as shown in Figure 12. When this problem occurs, the shell rim is allowed to bend as the firing pin hits and, in many cases, will not puncture the primer.

Also, check for dirt and debris in the receiver grooves which could prevent the action from locking completely. This, of course, will prevent the cartridge from firing; or if it should fire, escaping gases may endanger the shooter.

Firing pin length and condition are also important to ignite and to prevent damage to the action or the chamber.

If you suspect that there is a worn or broken firing pin, disassemble the bolt and inspect the firing pin tip or striker. If it is broken, it is best to install a factory replacement. If time is critical or a new pin is not readily available, a new tip can be welded on, dressed to size, and heat-treated to harden. However, by doing so, you will increase the customer's expense.

It is a good idea to stock an assortment of firing pins for the more popular guns. Although the time required may be

prohibitive, replacement firing pins can often be made in the shop using the old pin as a guide — especially if you own a lathe. Firing pins for almost every gun can be made on such lathes.

The troubleshooting chart in Figure 13 will prove helpful in repairing slide-action rimfire rifles of all types.

LEVER-ACTION RIMFIRE RIFLES

The lever-action rimfire rifle was introduced in 1884 when Winchester chambered their famous Model 1873 rifle for this cartridge. Marlin followed with its Model 1891 in .22 rimfire. For years, these were the only two lever-action rifles chambered for the .22 rimfire, except for certain rare, custom, or special-order rifles.

The Marlin Model 91 was a side-ejection, tubular- magazine, lever-action repeater which held up to 19 short or 14 long rifle cartridges. The rounds were loaded into the gun through a spring-actuated cover on the right side of the receiver, which could be removed from the breech for inspecting and cleaning the bore.

A short time after its introduction, the Model 91 was modified to permit loading the round from the front of the tubular magazine. Capacity was increased to hold 25 short or 18 long rifle cartridges. About the same time, a small number of Model 91s were offered in a .32-caliber chambering, with interchangeable firing pins for use with .32-caliber rimfire or centerfire cartridges. Barrels for the early Model 91s were available in several lengths and in a choice of round, half- octagonal, or full-octagonal shapes.

The Model 91 was soon replaced by the Model 92, which incorporated some minor changes. The Model 92 had an integral sear and trigger, while the sear and trigger components on the Model 91 were separate. There were also slight modifications in the firing pin, breechbolt, and trigger spring.

A takedown version of the solid-frame Model 92 was introduced in 1897. A notable variation of the Model 97 was the special Bicycle Model with a 16" barrel and a short magazine. Production of both the Model 92 and the Model 97 was discontinued in 1915 when the Marlin Company sold out to a firm manufacturing machine guns for the United States and

TROUBLESHOOTING CHART
.22-Caliber Rimfire Slide-Action Rifles

Malfunction	Probable cause	Corrective action
Fails to extract	Broken or weak extractor spring	Replace
	Dull extractor	Sharpen claw
	Rusted or pitted chamber	Polish or fit new barrel
Fails to eject	Dull extractor	Sharpen claw
	Weak extractor pin	Replace
	Broken ejector	Replace
Failure to chamber	Dirty extractor	Clean
	Weak extractor spring	Replace
	Carrier dog too short	Replace
Failure to feed	Dirty or dented magazine tube	Clean and/or remove dents
	Weak magazine spring	Replace
	Carrier lever too short	Replace
	Cartridge stop defective	Replace
	Action bar too loose	Replace
Failure to fire	Broken or worn firing pin	Replace
	Weak mainspring	Replace
	Action bar lock too short	Replace
	Fouled firing pin assembly	Clean

Figure 13: *Troubleshooting chart for .22 rimfire lever-action rifles.*



Figure 14: *After World War I, the Marlin Model 39 lever-action rimfire rifle gave the new Marlin Firearms Co. a much-needed boost that helped send them on the road to success.*

its allies. After World War I, the company tried to convert to sporting- arms production, but failed and went bankrupt. After the sale of the firm's assets, the new management dis- covered a stockpile of prewar Model 97 parts. Production was started on the new Model 39, shown in Figure 14, which differed from its predecessor primarily with its pistol-grip stock, beavertail forearm, and tapered, round 24" barrel. The company, elated over sales, became the new Marlin Firearms Company.

Commencing in 1954 and with the introduction of a carbine with a 20" barrel, the Model 39 became the Model 39A. This gun had a straight grip stock and a reduced-capacity magazine. Since then, Marlin has introduced a number of variations on the basic 39A design. However, all are essentially similar to the Model 1892.

In recent times, other .22 rimfire lever-action rifles have entered the scene. Winchester introduced its Model 250 and, later, its popular Model 9422. Figure 15, on the next page, shows an exploded view and parts list for the Model 9422. Browning followed suit, and so did Erma. Still, the handful of different lever-action rimfire models are relatively insignificant when compared to bolt-action, pump-action, and semi-automatic rifles.

Common Malfunctions. All .22 rimfire lever-action rifles use the tubular magazine, and feeding problems often occur due to dented, dirty, or corroded magazine tubes. Weak or broken magazine springs are another cause of misfeeding in these rifles. Recesses in the receiver of lever-action rifles, just like in slide-action .22s, collect dirt and debris that lead to feeding problems. The remedy is the same as for all other tubular magazine guns suffering from this problem — thoroughly clean the tube, remove the dents, and replace the magazine spring.

Next to the single-barrel shotgun, .22-caliber rifles seem to be the most abused guns. In some cases, one or two lands at the end of the barrel will be peened inward, causing the barrel to be highly inaccurate. If you encounter a .22 rimfire that does not shoot accurately, examine the muzzle very carefully with a magnifying glass to see if a land or two has been damaged. The problem can be corrected by sawing off a small portion of the barrel — just ahead of the front sight — and recrowning the muzzle. Sometimes a crowning tool, shown in Figure 16, will solve the, problem, and you will not need to use the saw. Chuck the barrel in a lathe and, using a crowning tool, cut the crown back about $^{1}/_{16}$ inch.

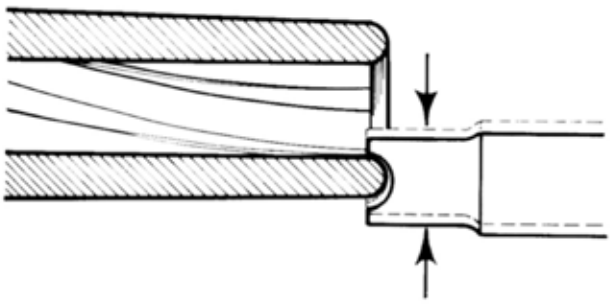
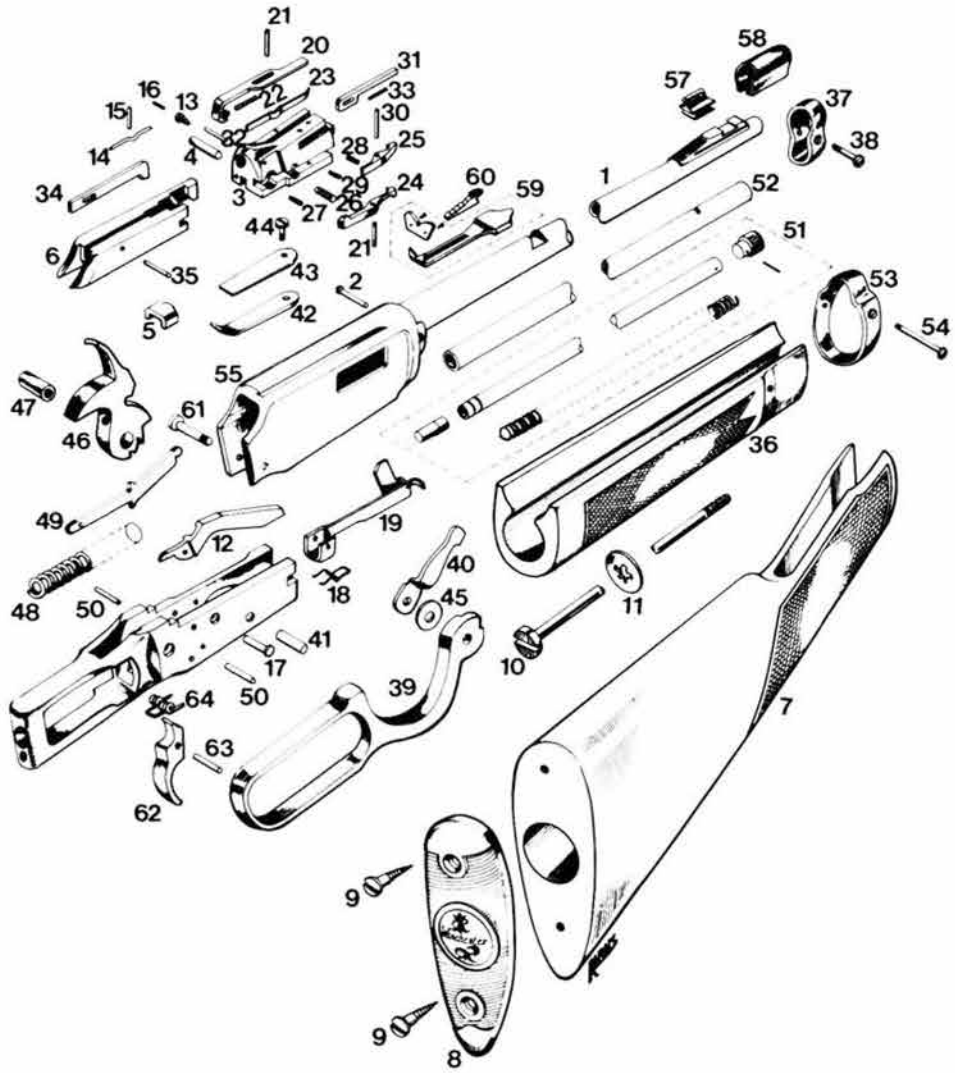


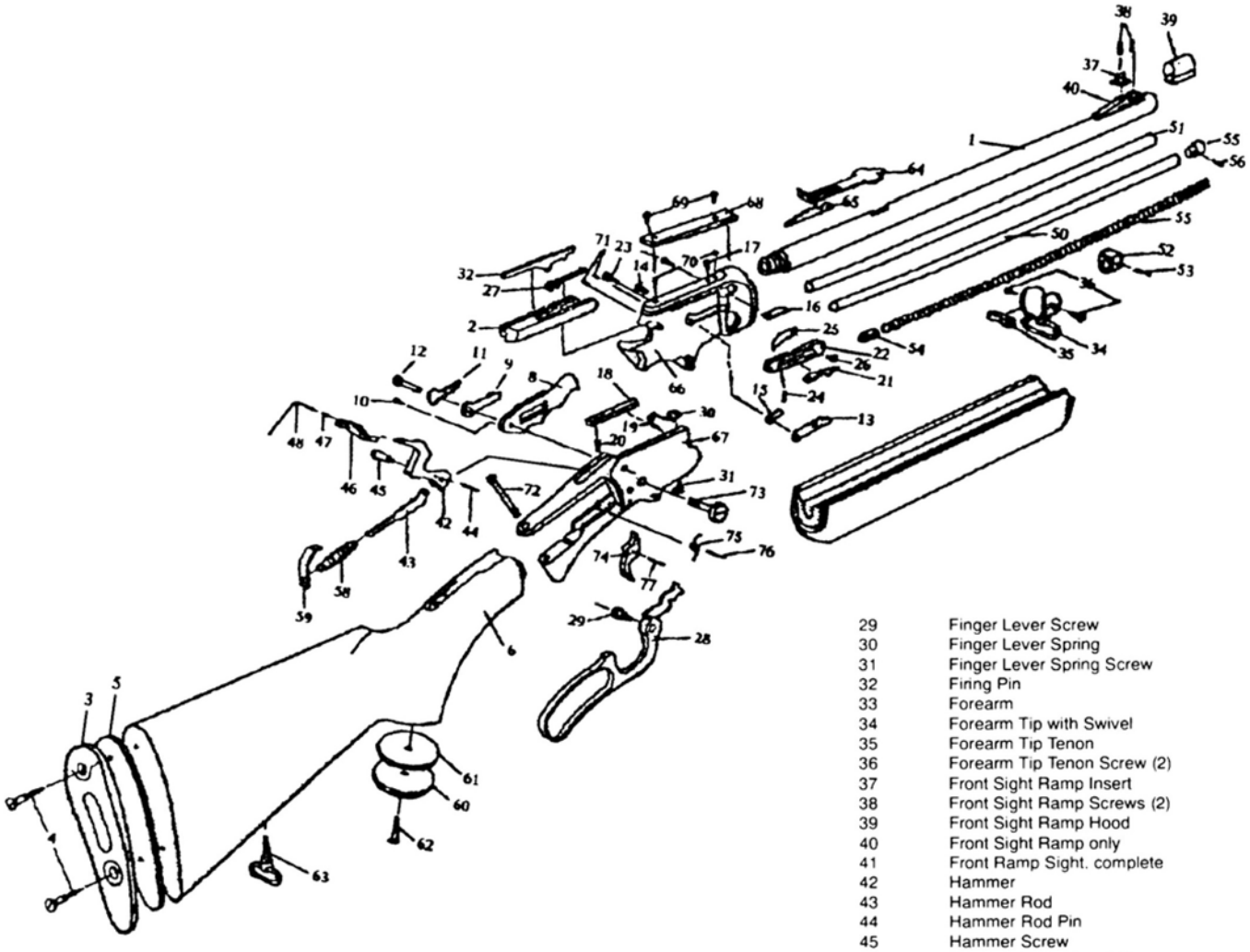
Figure 16: *If a lathe is available, a barrel crowning tool is the best way to correct rifle muzzle damage.*



Parts List

Key No.	Part No.	Part Name	Key No.	Part No.	Part Name	Key No.	Part No.	Part Name
1	149	Barrel	23	2149	Extractor, Left	43	4149	Finger-Lever Spring Plate
2	249	Barrel-Retaining Pin	24	2249	Extractor, Lower	44	4249	Finger-Lever Spring Screw
3	349	Breechbolt	25	7349	Extractor, Right Upper	45	7549	Finger-Lever Washer
4	549	Bolt-Cam Pin	26	2449	Extractor Lower Spring	46	8549	Hammer
5	649	Bolt Guide With Pad	27	2549	Extractor Lower Helper Spring	47	4549	Hammer-Pivot Bushing
6	749	Bolt Slide	28	2649	Extractor Right Upper Spring	48	7649	Hammer Spring
7	949	Buttstock	29	2749	Extractor Right Upper Helper Spring	49	4749	Hammer-Spring Guide Rod
8	694X	Buttplate				50	4849	Hammer Stop & Trigger Spring Pins (2)
9	9112	Buttplate Screws (2)	30	2494X	Extractor Right Upper Pin			
10	14102	Buttstock Bolt	31	2949	Firing Pin	51	4949	Magazine Tube, Inside
11	15102	Buttstock-Bolt Washer	32	3149	Firing-Pin Retainer Pin	52	5049	Magazine Tube, Outside
12	1049	Carrier	33	3049	Firing-Pin Spring	53	15094X	Rear Band
13	1149	Carrier Pawl	34	3249	Firing-Pin Striker	54	15294X	Rear-Band Screw
14	1249	Carrier-Pawl Retainer	35	3349	Firing-Pin Striker Retaining Pin	55	5349	Receiver/Frame
15	1349	Carrier-Pawl Retainer Pin				57	103H	Sight, Front
16	1449	Carrier-Pawl Spring	36	3449	Fore-End	58	3281	Sight, Front Cover
17	1549	Carrier Pin	37	3549	Front Band	59	32294	Sight, Rear
18	1649	Carrier Spring	38	7849	Front-Band Screw	60	3C	Sight, Rear Elevator
19	1749	Cartridge Cut-Off	39	3749	Finger Lever	61	5449	Takedown Screw
20	1849	Ejector	40	3849	Finger-Lever Arm	62	5549	Trigger
21	1949	Ejector Pins (2)	41	3949	Finger-Lever Pin	63	5649	Trigger Pin
22	2049	Ejector Spring	42	4049	Finger-Lever Spring	64	5749	Trigger Spring

Figure 15: An exploded view and parts list for the Winchester Model 9422 lever-action rifle. The rifle is offered in both .22 long Rifle and .22 Winchester Rimfire Magnum.



Part No.	Part Name
1	Barrel, 24" or 20"
2	Breech Bolt
3	Buttplate
4	Buttplate Screws (2)
5	Buttplate Spacer
6	Buttstock (Pistol Grip)
7	Buttstock (Straight Grip)
8	Carrier
9	Carrier Rocker
10	Carrier Rocker Screw
11	Carrier Rocker Spring
12	Carrier Screw
13	Cartridge Cutoff
14	Cartridge Cutoff Screw
15	Cartridge Cutoff Spacer
16	Cartridge Guide Spring
17	Cartridge Guide Spring Screw
18	Cartridge Stop
19	Cartridge Stop Spring
20	Cartridge Stop Pin
21	Ejector
22	Ejector Base
23	Ejector Base Screw (2)
24	Ejector Pin
25	Ejector Spring
26	Ejector Lock Rivet
27	Extractor
28	Finger Lever
29	Finger Lever Screw
30	Finger Lever Spring
31	Finger Lever Spring Screw
32	Firing Pin
33	Forearm
34	Forearm Tip with Swivel
35	Forearm Tip Tenon
36	Forearm Tip Tenon Screw (2)
37	Front Sight Ramp Insert
38	Front Sight Ramp Screws (2)
39	Front Sight Ramp Hood
40	Front Sight Ramp only
41	Front Ramp Sight, complete
42	Hammer
43	Hammer Rod
44	Hammer Rod Pin
45	Hammer Screw
46	Hammer Spur Complete
47	Hammer Spur Screw
48	Hammer Spur Wrench
49	Magazine Tube, inside complete
50	Magazine Tube, inside only
51	Magazine Tube, outside
52	Magazine Tube Band
53	Magazine Tube Band Pin
54	Magazine Tube Follower
55	Magazine Tube Spring
56	Magazine Tube Plug
57	Magazine Tube Plug Pin
58	Mainspring
59	Mainspring Adjusting Plate
60	Pistol Grip Cap
61	Pistol Grip Cap Spacer
62	Pistol Grip Cap Screw
63	Rear Swivel
64	Rear Sight, complete
65	Rear Sight Elevator
66	Receiver (left side)
67	Receiver Tang (right side)
68	Scope Adapter Base
69	Scope Adapter Base Screws (2)
70	Scope Dummy Screws (2)
71	Receiver Sight Dummy Screws (2)
72	Tang Screw
73	Thumb Screw
74	Trigger
75	Trigger Spring
76	Trigger Spring Pin
77	Trigger Pin

Figure 17: An exploded view and parts list for the Marlin Model 39A Rifle.

The **Marlin Model 39A**, shown in Figure 17, has a takedown feature that often causes the joints to loosen. These actions can be tightened, but extreme care must be taken to correct this problem. The object is to move metal, by peening, so that the sliding parts will fit closer in their recesses or grooves. Many owners of take down .22s try tightening the takedown screw itself by using a pair of combination pliers or else by using vise pressure, but this seldom helps matters. The opposing male parts must be adjusted by either stretching or widening to gain the desired fit.

Most springs in the Model 39A are relatively free from a great deal of flexing; therefore, breakage is rare. One exception is the ejector spring, which is subject to flexing every time the action is cocked. Because of this, the ejector spring on the Marlin Model 39A will break occasionally. Another spring that will sometimes break is the cartridge guide spring mounted in the top of the receiver. This spring is flexed upward each time the action is closed, and eventually — after much use — it will break at the screw hole. Replacement of this spring is relatively easy, since the screw enters from outside the action and threads directly into the spring. However, be very careful not to cross-thread this tiny screw during the installation.

The top surface of the lever finger, where it mates with a corresponding angled surface on the underside of the breechbolt, sometimes becomes worn after many thousands of rounds have passed through the rifle. This causes the breech not to close tightly. You can correct this problem by building up the top of the lever arm with steel weld and then recutting it to fit. Of course, this surface should be rehardened before the final installation.

Occasionally the cartridge cut-off will become wedged against the upper edge of its recess in the receiver. Since there will then be nothing to stop the next round in the magazine, the gun will invariably jam. To correct this, loosen the cartridge stop screw, carefully center and hold the cartridge stop in its recess, and retighten the screw.

Although the firing pin for the Marlin .22 looks very simple, a broken pin should be replaced with a factory replacement. Its several projections and planes are precisely related to the lever and breechblock and are difficult to obtain in the shop.

Marlin Model 57M Levermatic. This .22 rimfire lever-action rifle, shown in Figure 18, was introduced in 1955 and featured an enclosed-hammer design and a very short lever stroke — entirely different from the Model 39A. Replacing parts of this gun is not for amateurs, as it involves dealing with several small- pinned parts. The most frequent problems will occur with the cartridge guide, extractor, and firing pins.

Remington Nylon 76. Remington Arms Co. introduced this .22 lever-action rifle in 1962. It featured a short-stroke lever which enabled it to be operated at a much faster speed than most of the longer-stroke lever- action rifles. However, the rifle was discontinued and only its close cousin, the Nylon 66 semi-automatic rifle, gained much popularity.

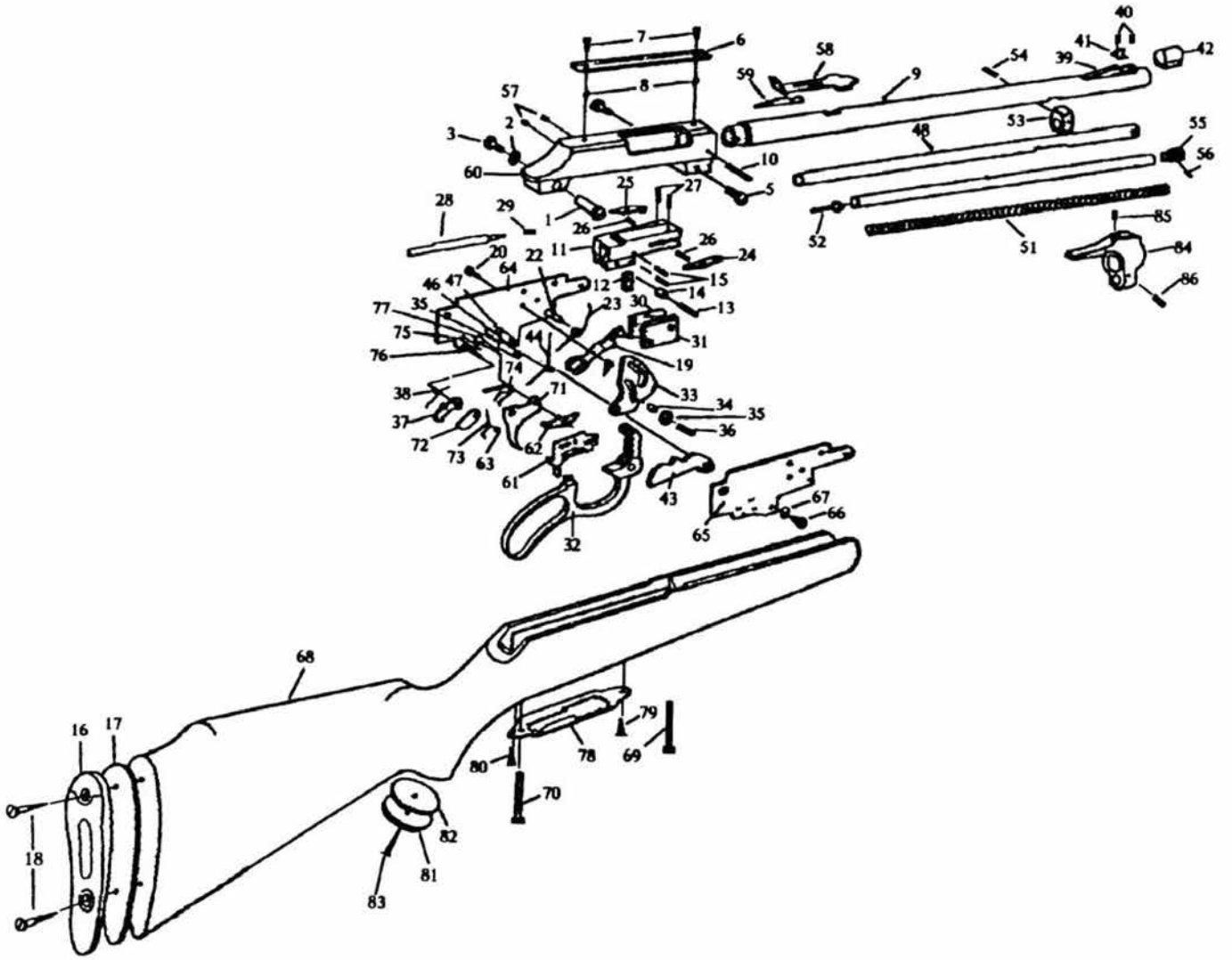
As a novice, you should not disassemble the Nylon 76 unless you have an exploded view and detailed instructions at your fingertips. When this gun is first opened, it strongly resembles a cheap toy consisting of sheet steel parts and expansion coil springs, very few of which make any sense at first glance. However, the gun is a carefully engineered design that functions well with little maintenance.

There are three basic part groups that are subject to breakage — the safety lever, the springs, and the dis- connector. When replacing any of these parts, try not to release the striker because it will take a lot of time and patience to reposition this once it is released. Refer to Remington's Field Repair Manual when working on this model.

Winchester Model 250. Here's another hammerless .22 lever-action rifle that was made for a relatively short period of time, then discontinued. In general, the Model 250, shown in Figure 19, is a relatively trouble- free rifle as long as no adjustments — like adjusting the trigger pull — are made. For example, the cartridge feed guide is made of very lightweight steel and it must be just right for proper feeding. Any attempt to alter the shape of this part usually requires a replacement.

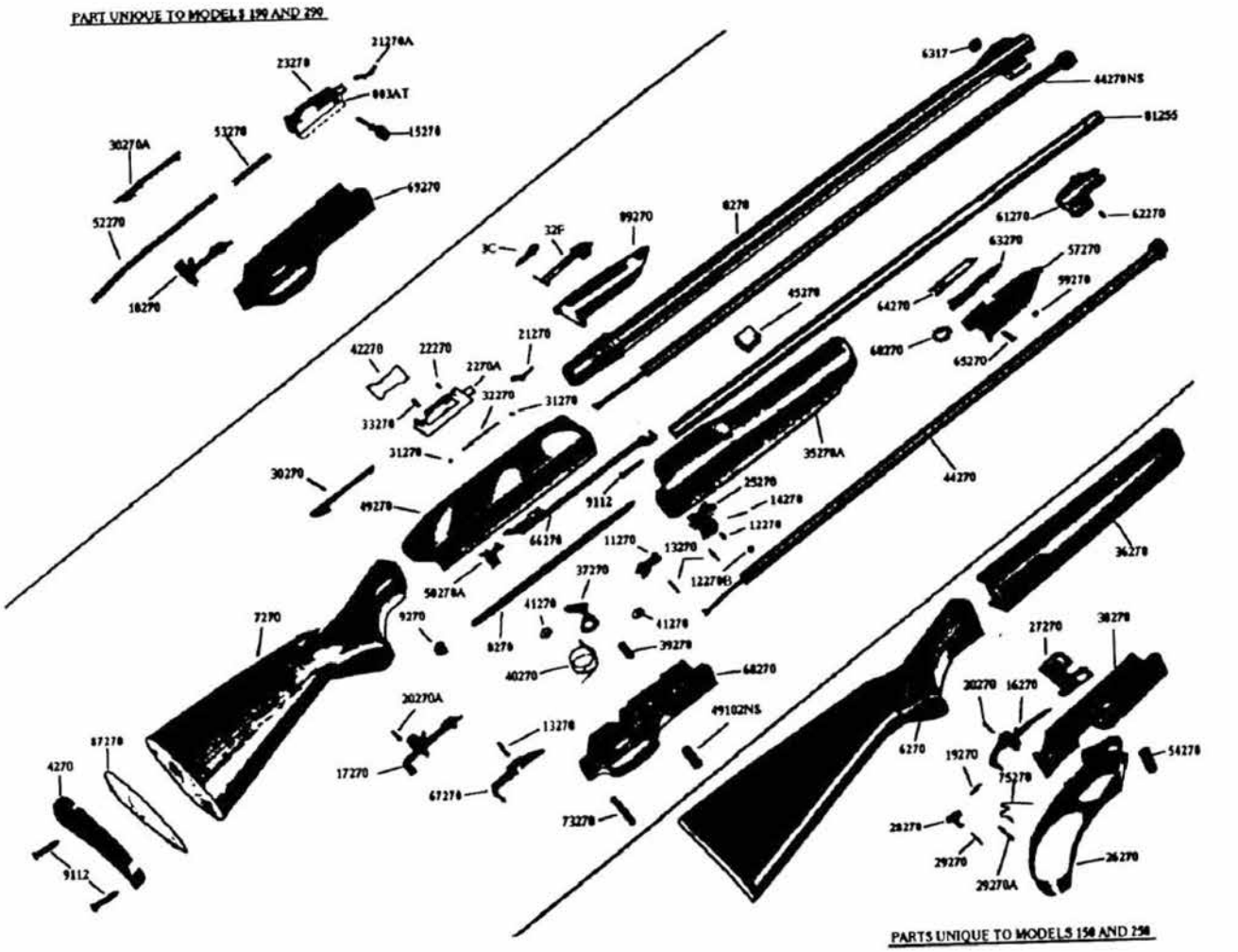
The wearing quality of this gun is not the best, and reports indicate that parts begin to wear out after a couple of thousand rounds or so — probably one reason why this model was discontinued.

Winchester Model 9422. This rifle was introduced in 1972 as a small-caliber companion to the popular Model 94, and there is a close external resemblance to the two models. The cartridge feed system of this rifle utilizes a tubular magazine under the barrel and is very similar in operation to an earlier Winchester design — the Model 61 slide-action rifle.



Part No.	Part Name
1	Assembly Post, rear
2	Assembly Post Washer
3	Assembly Post Screw
4	Assembly Screw Washer (2 per gun)
5	Assembly Screws (2 per gun)
6	Adaptor Base
7	Adaptor Base Screws (2 per gun)
8	Adaptor Base Dummy Screws (2 per gun)
9	Barrel 22 Rimfire
9A	Barrel 22 Magnum Rimfire
10	Barrel Retaining Pin
11	Breech Bolt only
12	Breech Bolt Bearing Insert
13	Breech Bolt Cam Roller Pin
14	Breech Bolt Cam Roller
15	Breech Bolt Bearing Insert Pin (2 per gun)
16	Buttplate
17	Buttplate Spacer
18	Buttplate Screws (2 per gun)
19	Cartridge Lifter
20	Cartridge Lifter Pivot Stud
21	Cartridge Lifter Stud Ring
22	Cartridge Lifter-Spring Mounting Pin
23	Cartridge Lifter Spring
24	Extractor, R.H.
25	Extractor, L.H.
26	Extractor Spring (2 per gun)
27	Extractor Pin (2 per gun)
28	Firing Pin
29	Firing Pin Spring
30	Feed Throat, L.H.
31	Feed Throat, R.H.
32	Finger Lever
33	Finger Lever Cam
34	Finger Lever Cam Roller
35	Finger Lever Pivot Pin
36	Finger Lever Cam Roller Pin
37	Finger Lever Latch
38	Finger Lever Latch Spring
39	Front Sight Ramp only
40	Front Sight Ramp Screws (2 per gun)
41	Front Sight Ramp Insert
42	Front Sight Ramp Hood
43	Hammer
44	Hammer Spring
45	Hammer Cocking Roller
46	Hammer Spring Mounting Pin
47	Hammer Pivot Pin
48	Magazine Tube, outside
49	Magazine Tube, inside only
50	Magazine Tube Assembly, inside
51	Magazine Tube Spring
52	Magazine Tube Follower
53	Magazine Tube Band
54	Magazine Tube Band Pin
55	Magazine Tube Plug
56	Magazine Tube Plug Pin
57	Rear Sight Dummy Screws (2 per gun)
58	Rear Sight with Elevator
59	Rear Sight Elevator
60	Receiver
61	Safety Slide
62	Sear
63	Spacing Sleeve
64	Sideplate Assembly, left side
65	Sideplate, right side
66	Sideplate Assembly Screw
67	Sideplate Assembly Screw Lockwasher
68	Stock
69	Takedown Screw, front
70	Takedown Screw, rear
71	Trigger
72	Trigger Block
73	Trigger Block Spring
74	Trigger & Sear Spring
75	Trigger Block Pivot Pin
76	Trigger Stop Pin
77	Trigger & Sear Pivot Pin
78	Trigger Plate
79	Trigger Plate Screw, front
80	Trigger Plate Screw, rear
81	Pistol Grip Cap
82	Pistol Grip Cap Spacer
83	Pistol Grip Cap Screw
84	Front Ramp Sight
85	Front Ramp Sight Screw
86	Magazine Tube Binding Pin

Figure 18: An exploded view and parts list for the Marlin Model 57M Levermatic.



Part No.	Part Name
003AT	Breech Bolt, complete
0270	Barrel and Barrel Collar
11270	Carrier
12270	Carrier Coil Spring
12270B	Carrier Coil Spring Plunger
13270	Carrier Pin
14270	Carrier Stop Pin
15270	Cocking Handle
16270	Disconnector and Sear Assembly
17270	Disconnector and Sear Assembly
18270	Disconnector and Sear Assembly
19270	Disconnector Coil Spring
2270A	Breech Bolt, complete
20270	Disconnector Pin
20270A	Disconnector Pin
21270	Extractor
21270A	Extractor
22270	Extractor Pin
23270	Extractor Pin
25270	Feed Guide
26270	Finger Lever
27270	Finger Lever
28270	Finger Lever Latch
29270A	Finger Lever Pin
3C	Sight, rear
32F	Sight, rear
30270	Firing Pin
30270A	Firing Pin
31270	Extractor Plunger
32270	Firing Pin Spring
33270	Firing Pin Stop Pin
35270A	Forearm
36270	Forearm - Wood, Checkered
37270	Hammer
38270	Hammer Housing
39270	Hammer Pin
4270	Butt Plate
40270	Hammer Spring
41270	Hammer Spring Support (2 Required)
42270	Locking Plate
44270	Magazine Tube, inside assembly
44270NS	Magazine Tube, inside assembly
45270	Magazine Tube Bracket
47270	Pistol Grip Cap Assembly
49102NS	Safety
49270	Receiver
50270A	Recoil Plate
52270	Return Spring
53270	Return Spring guide
54270	Safety
57270	Sight Base, rear
59270	Sight Base Screw, rear
6270	Butt Stock, Checkered
6317	Sight, front (metal)
60270	Sight Elevator, rear
61270	Sight, front (plastic)
62270	Magazine Tube Retaining Pin, outside
63270	Sight Leaf, rear
64270	Sight Spring, rear
65270	Sight Windage Screw, rear
66270	Slide Arm
67270	Trigger Assembly
68270	Trigger Guard
69270	Trigger Guard
7270	Butt Stock, Checkered
73270	Trigger Guard Pin, rear
75270	Trigger Spring
8270	Butt Stock Bolt
87270	Butt Plate Spacer
89270	Barrel Collar Cover
9112	Butt Plate Screw (2 Required)
9270	Butt Stock Nut Washer

Figure 19: An exploded view and parts list for the Winchester Model 250.

Lever-action .22 rimfire rifles are prone to the same malfunctions as .22 slide-action rifles. For example, types have tubular magazines, the lock-up arrangements are of about equal strength, and both have relatively weak extraction systems. There are also many other similarities in basic trigger assemblies and safety design. Therefore, feeding and lock-up problems will be similar in both types.

The troubleshooting chart in Figure 20 shows some of the more common problems that develop in lever-action rimfire rifles. However, try to obtain additional troubleshooting data for each gun from the factory.

SEMI-AUTOMATIC RIMFIRE RIFLES

Most .22-caliber semi-automatic rifles use the blowback design, where the barrel remains stationary while the bolt or breechblock moves to the rear under the force of push from the exploding cartridge; that is, blowback systems function through manipulation of the laws of inertia (Figure 21).

Some .22-caliber semi-automatics with badly worn parts can fire fully automatic, creating dangerous and highly illegal firearms. However, most incorporate a disconnector which holds the hammer back and prevents it from following the breechbolt to the firing position, making a separate trigger pull necessary for each shot.

If you were to list all of the potential trouble sources and adjustment-repair sequences for all semi-automatic rimfire rifles, you would wind up with a sizable volume. However, the similarities in function (and malfunction) among the various semi-automatics are more pronounced than the design differences. While such guns generally fail more often than guns of other designs (bolt-action rifles, pump-action rifles, etc.), the reasons for the malfunctions can be determined and usually are not difficult to correct.

Most semi-automatic rifles chambered for the .22 rimfire and .22 Winchester magnum cartridges use blowback-type actions. As the name implies, the force of the fired cartridge blows back against the breech- block, pushing it to the rear. Since the breechblock is heavier and is also held by a spring, the fired bullet — moving at a much faster velocity than the breechblock— leaves the muzzle before the block is moved to the rear. While the breech is being thrown open by the force of the fired cartridge, it ejects the empty cartridge case. When the spring finally stops the breechblock, it starts it moving forward to pick up a new cartridge from the cartridge lifter and pushes the cartridge into the chamber. The movement of the breechblock also cocks the hammer so that once the breech is in the forward position, the rifle is ready to fire again. This sequence of operation and firing can be continued until the magazine is empty.

Since the blowback system depends on spring tension and the weight of the breechblock for proper operation, the power of cartridges used in the guns with this type of mechanism must be limited. This system is usually limited to cartridges of .22-caliber rimfire power.

TROUBLESHOOTING CHART
.22-Caliber Rimfire Lever-Action Rifles

Malfunction	Probable cause	Corrective action
Fails to extract	Broken or weak extractor spring	Replace extractor spring
	Dull extractor	Sharpen extractor claw
	Rusted or pitted chamber	Polish or fit new barrel
Fails to eject	Dull extractor	Sharpen claw
	Weak or broken extractor pin	Replace
	Broken ejector	Replace
Fails to feed	Dirty or dented magazine tube	Clean and/or remove dents
	Weak magazine spring	Replace spring
	Carrier lever too short	Replace
	Cartridge stop defective	Repair or replace
	Action bar too loose	Tighten or replace

Figure 20: *Troubleshooting chart for rimfire lever-action rifles.*

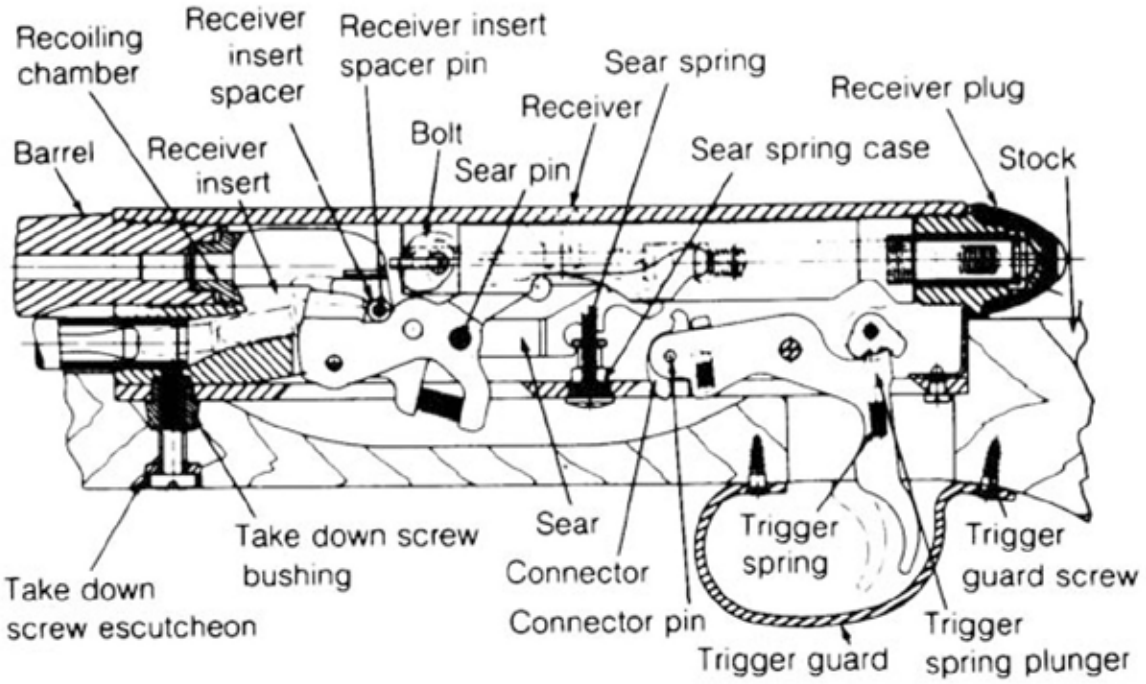


Figure 21: *A sectional view of the Remington Model 550-A semi-automatic .22-caliber rifle.*

Common Malfunctions. The most common malfunction found with semi-automatic rimfire rifles is misfeeding. At least 9 out of 10 of these rifles come into repair shops with feeding problems, usually due to a weak magazine spring or a worn or broken cartridge lifter. A dirty action is another cause of misfeeding.

Feeding Problems. In tubular-magazine .22 semi- automatic rifles such as the Stevens Model 87-A rifle, the cartridges are cammed up for feeding by a lifter or carrier actuated by the bolt. As the bolt rebounds forward under spring pressure, after being blown back by the fired cartridge, it cams the carrier up in its track to position a new cartridge so the bolt can pick it up and push it into the chamber. These grooves often become worn, binding the carrier and resulting in the action jamming. A replacement operating slide is the answer.

The cartridge lifter or carrier is another frequent source of trouble. This is the device that lifts the cartridge from the magazine tube up to the feed lips so that the cartridge can be picked up by the bolt on its return, or forward, movement. Its movement on Savage .22 semi-automatics is controlled by two lobes on top of its pivot end, and any wear on these can cause trouble with the feeding. A worn lifter will either fail to depress far enough for a cartridge to enter the magazine guide or fail to use far enough for a cartridge to enter the feed lips.

A lifter spring, shown in Figure 22, is another potential source of trouble that can cause misfeeding and jams. When the spring is weak, it does not depress the carrier far enough to permit feeding cartridges from the tube into the action. A replacement is the only answer.

Broken or bent cartridge or feed guides also cause feeding problems. On the Savage rifles, the cartridge guide is made of formed sheet steel, and the ejector is an integral part of the guide. Should the ejector become worn or break, the entire guide must be replaced. If the guide is only bent, needle-nose pliers may sometimes be used to correct the situation, except when the part is cast.

The disconnector system on the Savage .22s can be somewhat tricky; the spring tension in this system is critical and, if not correct, can result in feeding problems, fully automatic firing, etc.

Failure to Fire. When a semi-automatic rifle fails to fire, the cause is most often debris and foreign matter in the bolt, which prevents the firing pin from moving forward the proper distance and/or at the proper speed. Complete disassembly and degreasing is the solution for this problem.

The firing pin may be rusted at the front end or broken off completely. In either case, a new firing pin should be installed. Also check the mainspring and replace it if it is weak or broken.

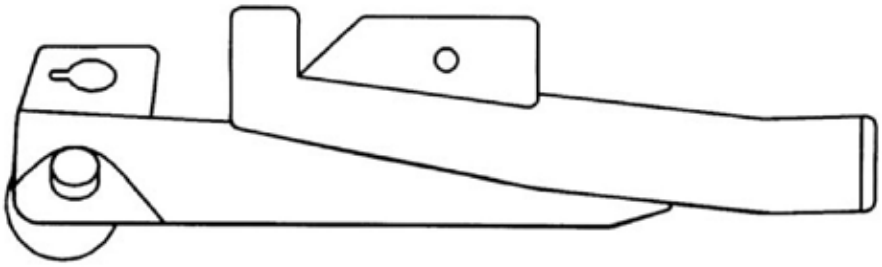


Figure 22: *A new cartridge lifter replaced in a Stevens Model 87-A semi-automatic rifle.*

Here are some steps to help you locate other probable causes of misfires:

- Check the protrusion of the firing pin; it should be at least $^{1}/_{16}$ inch.
- Check the extractor to be sure it is not binding.
- Check the face or hook of the extractor for burrs.
- Check the extractor cut in the barrel for burrs.
- Check the extractor cut in the barrel to be sure the extractor lines up and is not hitting the edges of the cut due to a slight rotation of barrel.
- Check the striker for burrs.
- Check the firing pin assembly to be sure the ejector and its spring can move rearward in the assembly.

Action Fails to Close. The most probable causes of this malfunction in .22-caliber semi-automatic rifles lie in the breechblock, the bullet incline in the cartridge guide, or a fouled magazine tube. The solution to all of these is simple: clean and degrease all affected parts. Also polish the bullet incline and oil it to prevent rust.

When an action fails to close and a thorough cleaning does not solve the problem, look for a cartridge guide spring that is out of adjustment. If you find it defective, adjust or fit a new one. Here are some other items to check when an action fails to close:

- Check for rub marks in the stock caused by the moving parts of the action.
- Check the alignment of the operating slide guide to the receiver.
- Check the end coil of the mainspring.

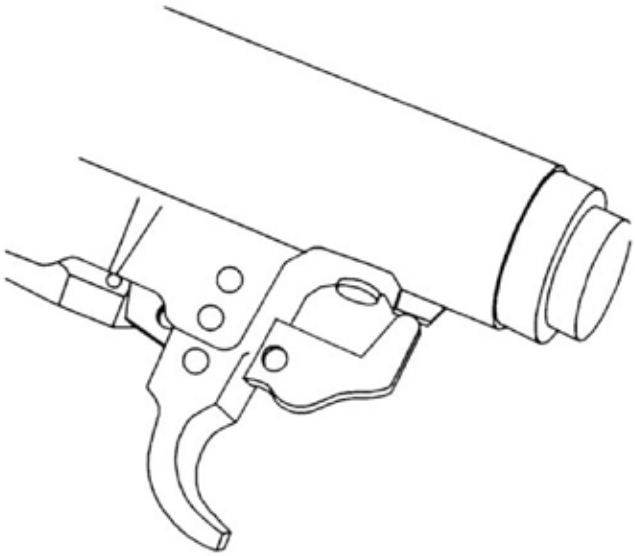


Figure 23: *Nearly all semi-automatic rifles use trigger-block safeties.*

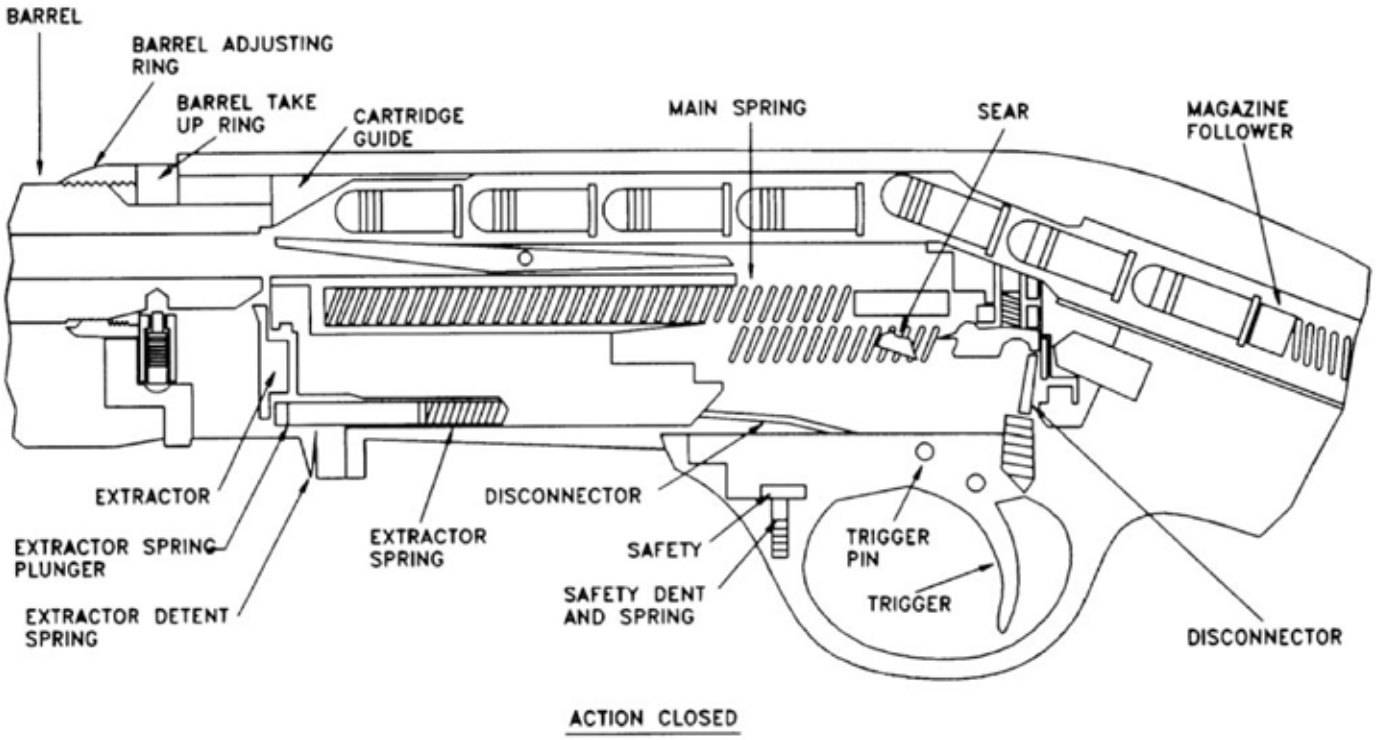


Figure 24: *A sectional view of the Remington Model 241 semi-automatic rifle.*

- Check for a bolt interfering on the feed lips of the magazine.
- Check the extractor to be sure it is not binding.
- Check the face or hook of the extractor for burrs.
- Check the extractor cut in the barrel to be sure the extractor lines up and is not hitting the edges of the cut due to a slight rotation of barrel.

If you find any of the above faults, replace any worn or broken parts and hone and polish any surfaces that contain burrs or rough edges.

Loose Barrel or Stock. Check for a loose barrel- adjusting ring or for a broken barrel-locating pin. Adjust the ring or replace the pin. In Winchester Model 77 rifles, check the inletting and bedding of the barrel to stock; the pressure point should be at the fore-end tip only.

Loose stocks may be caused by the stock-bolt nut being loose in some rifles or by bolt holes enlarged due to wear. Cracks in the wood can also loosen the stock.

Faulty Safeties. Nearly all semi-automatic rifles use trigger-block safeties, shown in Figure 23, which are not as positive as the striker-block systems found in many centerfire rifles. Most safeties of this type use a spring-loaded plunger that works in two notches. When the safety is pushed from safe to fire, the

TROUBLESHOOTING CHART
.22-Caliber Rimfire Semiautomatic Rifles

Malfunction	Probable cause	Corrective action
Fails to lock	Faulty engagement of carrier to carrier dog	Hone until fitted properly
	Worn carrier	Replace
	Worn carrier dog	Replace
	Weak or broken carrier spring	Replace
Carrier fails to lift cartridges	Weak or broken carrier dog spring	Replace
	Carrier dog broken	Replace
Fails to extract	Extractor claw dull or weak	Sharpen claw or replace
	Extractor clearance cut in barrel too deep	Replace barrel
	Edge of chamber has heavy burr	Ream out burr
Fails to eject	Extractor has too much space between claw and face of breechblock	Bend lug to shorten space at claw
	Improperly fitted firing pin	Replace
Fails to feed	Rust, dirt, or dents in magazine tube	Clean and repair
	Faulty cartridge stop	Reduce bevel at lower front end
	Guide ways in face of breechblock too wide	Replace
	Firing pin held too far forward	Bend ejector spring slightly towards rear of rifle
Hammer fails to cock	Notch of hammer broken	Replace hammer
Fails to fire	Broken or worn firing pin	Replace
	Weak mainspring	Replace
	Rusted firing pin	Clean or replace
	Cartridge supporting surface at end of barrel has become upset, allowing cartridge rim to bend without pinching priming	Fit new barrel and firing pin

Figure 25: Troubleshooting chart for .22-caliber semi-automatic rifles.

plunger is depressed and rides over a "hill" that separates the two notches. When this hill becomes rounded, a new safety should be installed.

The problem could also lie with the trigger. If it is cut away too much or broken at the front end, the trigger will pull when the safety is on. If this is the problem, a new trigger will probably need to be fitted. Note in Figure 24 that the safety is in the trigger guard just ahead of the trigger. If just a small amount of the trigger front end is worn or broken, the safety will fail.

Remember, you can correct most problems with .22-caliber rimfire semi-automatic rifles by cleaning the rifle thoroughly. This procedure usually requires that the metal parts be removed from the wooden stock, then soaked in a commercial cleaning solution to remove all oil, grease, and grime. A plastic tank large enough to hold the barreled action is ideal for soaking. You will also need a selection of brushes to get to hard-to-reach places. Toothbrushes, baby bottle brushes, etc. can be purchased locally and are excellent for cleaning firearms. Use enough cleaning solution in the plastic tank to cover the firearm completely. Use the brushes to get any stubborn grime off of the parts and in the action. This is a good time to inspect all parts for damage or wear. Once the parts are clean, dry them with either compressed air or a conventional hair dryer and then coat all parts with a light coat of gun oil.

Refer to the troubleshooting chart in Figure 25, for additional malfunctions and their corrective actions.

SELF-TEST QUESTIONS

Please check your answers on page 27.

5. **What causes .22 cartridges to swell under the extractor, causing it to slip off the cartridge rim?**
6. **Name one thing that can prevent a .22 fired cartridge from ejecting.**
7. **What is the probable cause when a fired .22 rimfire cartridge shows a bent rim?**
8. **When a .22 rimfire tubular-magazine rifle fails to feed, what is the probable cause?**

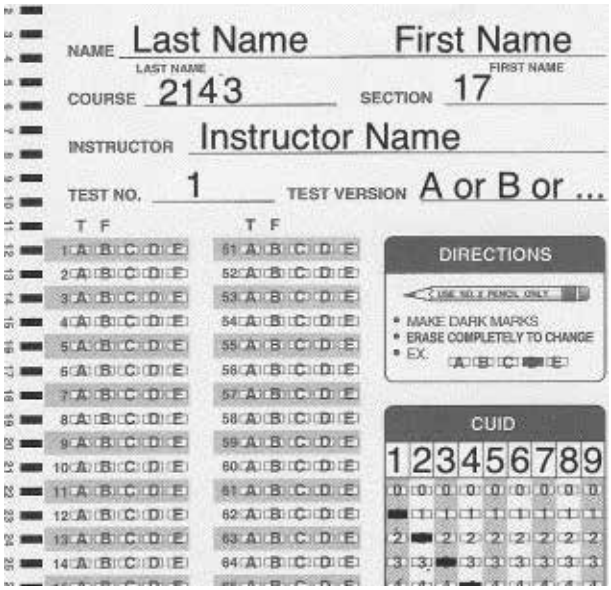
Answers to Self-Test Questions

1. Determine what caused the problem.
2. A broken or worn firing pin.
3. A corroded chamber has made it difficult to extract the fired cartridge, and has eventually weakened the extractor.
4. Dry firing: snapping the hammer without a cartridge in the chamber.
5. The extractor clearance cut in the barrel is too deep.
6. Too much space between the claw and the face of the breechbolt.
7. The cartridge-supporting surface at the end of the barrel where the firing pin strikes may be enlarged or out of position.
8. The magazine tube is dirty or dented.

Lesson Questions

THIS IS LESSON NUMBER 2174.

Make sure you print your name, student number, and lesson number in the space provided on the Lesson Answer Form. Be sure to fill in the circles beneath your student number and lesson number.



REMINDER: A properly completed Lesson Answer Form allows us to evaluate your answers and send the results and additional study material to you. Do not hold your Lesson Answer Forms to send several at one time. You may run out of study material if you do not send your answers for evaluation promptly.

You may also complete your exam online at www.sdi.edu, click on the *online exams* tab.

1. **When a novice disassembles a firearm, one common problem that develops is the inability to reassemble it correctly.**
   a. True.
   b. False.

2. **What type of illustration, usually supplied by a firearm's manufacturer, aids the gunsmith in disassembly and reassembly?**
   a. A photograph of the assembled gun.
   b. An orthographic view of gun parts.
   c. A troubleshooting drawing.
   d. An exploded view.

3. **After you disassemble a firearm and thoroughly clean all the parts, what should be your next step?**
   a. Quickly reassemble it before the parts become lost.
   b. Carefully examine all internal parts for wear or breakage.
   c. Check an exploded view to see if you did the job correctly.
   d. Quickly oil all parts to prevent rust.

4. **When a .22-caliber rimfire rifle misfires and you have found the firing pin to be okay, which of the following is another malfunction that could cause the rifle to misfire?**
   a. A loose sling swivel.
   b. A fouled rifle bore.
   c. A broken mainspring.
   d. A loose buttplate.

5. **Which one of the following statements is true?**
   a. Cleaning a firearm will often correct a malfunction.
   b. You should never clean a firearm more than twice a year.
   c. You should never clean a firearm more than once a year.
   d. Cleaning a firearm will allow you to examine parts better, but will never help to correct a malfunction.

6. **Which of the following can cause corrosion in a .22 rimfire Long Rifle chamber?**
   a. Frequent firing of .22 shorts.
   b. Frequent firing of .22 Long Rifle cartridges.
   c. Too much oil.
   d. Not firing the rifle enough.

7. **Dry firing a .22 rimfire rifle can cause many problems, but the main one is**
   a. A broken safety.
   b. Corrosion of the chamber.
   c. The firing pin can force a ridge of metal into the chamber area.
   d. The practice will cause rimfire cases to bulge upon firing.

8. **Name one tool that may be used to remove burrs in .22 rimfire chambers.**

a. A crowning tool.
b. A chamber ironing tool.
c. A spanner wrench.
d. A broken shell extractor.

9. On a slide-action rifle, which one of the following can prevent the rifle from ejecting properly?

a. A dull extractor.
b. A short action bar.
c. A broken firing pin.
d. A defective cartridge stop.

10. On a semi-automatic rifle, which of the following can prevent the hammer from cocking?

a. A broken firing pin.
b. A broken hammer notch.
c. A worn mainspring.
d. A broken carrier dog.