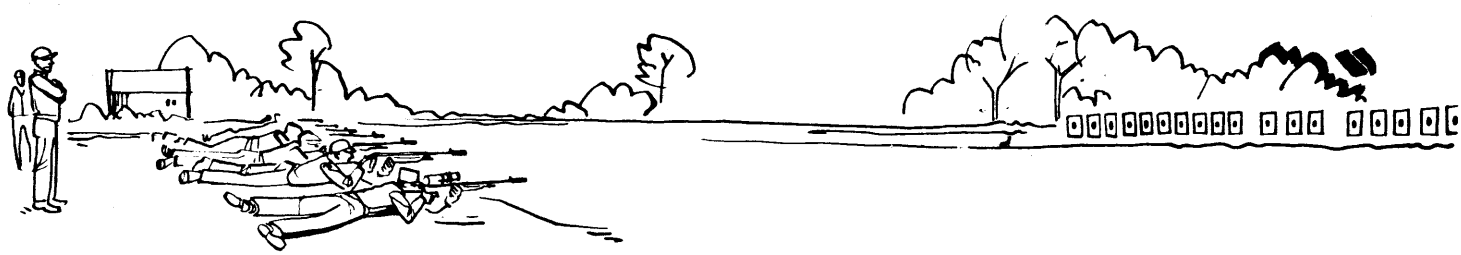
NATIONAL MATCH RIFLES

U.S. CAL. 7.62 MM M14 AND U.S. CAL. .30, M1 AND NATIONAL MATCH AMMUNITION

CAMP PERRY, OHIO



U. S. ARMY MATERIEL COMMAND

U. S. ARMY WEAPONS COMMAND - U. S. ARMY MUNITIONS COMMAND

U. S. ARMY MATERIEL COMMAND
WASHINGTON, D. C.

The United States Army Materiel Command is happy to welcome you to the 1967 National Matches and to present this brochure describing the weapons and ammunition to be used in this year's competition.

The contribution of the U. S. Army Materiel Command to the U. S. 1967 National Matches is a concerted team effort by many individuals and groups. Each has played an outstanding role in supporting this year's National Match.

In the forefront of this effort are the U. S. Army Weapons Command and the U. S. Army Munitions Command, which, in coordination with America's industry, are responsible for developing the best possible small arms and ammunition for our armed forces.

The U. S. Army Materiel Command is proud to provide ordnance support for the National Matches with materiel and trained personnel.

The principal objectives of the National Board for the Promotion of Rifle Practice and the Director of Civilian Marksmanship are always in our planning to help make this event one of national significance.

F. S. BESSON, JR.
General, USA
Commanding

HISTORY

The M14 National Match Rifle is of the same basic design and operation as the standard issue M14 rifle, except for modification to eliminate full automatic firing capability and the use of special parts. This weapon is a lightweight, air-cooled, gas operated, semi-automatic, magazine fed rifle chambered for the 7.62mm NATO National Match cartridge and refined to provide a high degree of accuracy for marksmanship and competitive purposes.

An engineering program was initiated at the Springfield Armory to develop and fabricate prototype M14 National Match Rifles in 1959. During 1962 and 1963 M14 National Match Rifles were fabricated based on the requirements developed and established during the National Match Engineering Program. The M14 National Match Rifles were made available at the 1963 National Rifle Matches for shooter orientation and familiarization. The following year by year breakdown indicates the quantity of M14 National Match Rifles produced.

Year	Manufactured By	New	Rebuilt	Total
1962	SA	3,000		3,000
1963	SA	3,550		3,550
1964	TRW	4,874		4,874
1965	SA		2,094	2,094
1966	SA		2,395	2,395
1967	RIA		2,462	2,462

The significant differences between the standard M14 Service Rifle and the M14 National Match Rifle are as follows: The barrel bore is machined to one-half of the tolerances of the standard barrel requirements and is not chromium plated; the stock assembly is glass bedded to provide a custom fit with the action; components are selectively fitted and assembled; the selector shaft, sear release, selector lock, and receiver sear release lug are permanently welded; the rear sight assembly is selectively assembled and provides ½ minute angle of windage and elevation adjustment.

Each M14 National Match Rifle is required to fire 62 match rounds without a malfunction during targeting and accuracy tests. The extreme spread of five, ten round groups shall average 3.5 inches at 100 yards. Rock Island Arsenal is continuing its Engineering Program in order to provide refinements to further improve accuracy of the M14 National Match Rifle.

1967 M14 RIFLE (NM)

The 1967 model shown below represents the latest refinement of the M14 as a National Match rifle.

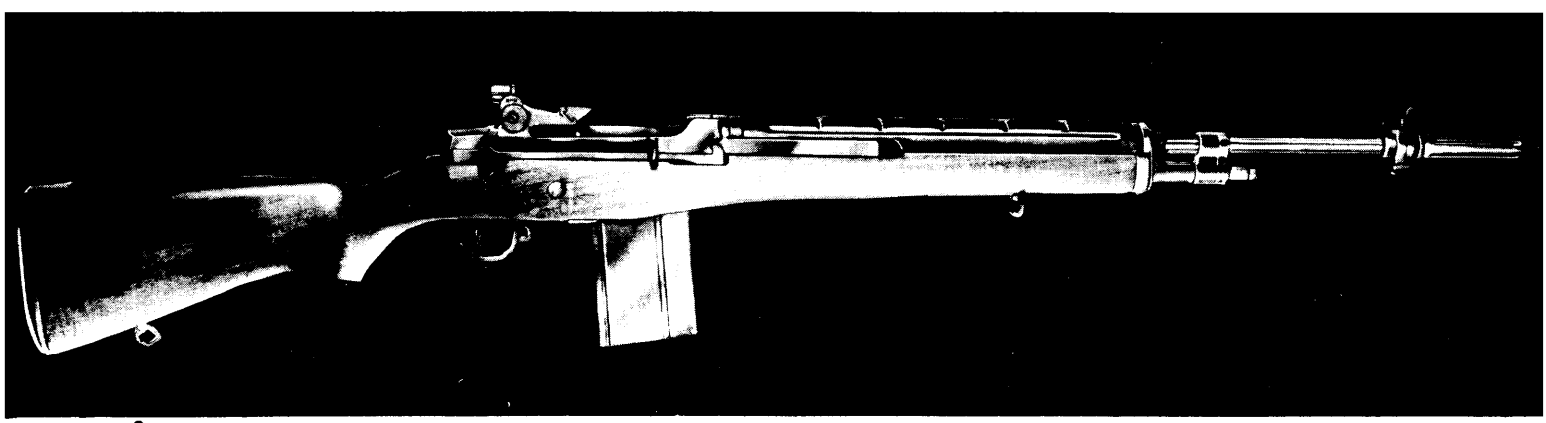
Over the years many modifications have been made to improve the accuracy and targeting capabilities of the M14. Those described on page 3 and illustrated on pages 4 and 5 have been found to produce the best results when judged by the performance average of large numbers of rifles.

The National Match M14 has a hooded eyepiece rear sight. This sight will make possible ½ minute changes in elevation, and will be available in two peep hole diameters. Scores will improve with the hooded eyepiece, because the sight picture will be much more constant under changing light conditions.

In addition, new rear sight bases have been designed to considerably minimize movement between the aperture assembly and the mating surfaces in the base. The new rear sight base will be identified with the letters NM/2A.

Notes on inspection of barrels and of the completed rifle will be found on page 14. Page 16 will provide useful information of rifle maintenance.

1967 NATIONAL MATCH RIFLE, U. S. CAL. 7.62 M/M, M 14



GENERAL REQUIREMENTS

1967 NATIONAL MATCH RIFLE, U.S. CAL. 7.62 m/m, M14

All components shall conform to the latest design.

All wooden components shall be of solid heartwood with the direction of grain parallel to the longitudinal axis of stock.

The stock shall be glass bedded and custom fitted to barrel and receiver assembly and trigger housing assembly. The stock assembly and the trigger housing assembly shall be identified with last four digits of the receiver serial number. These assemblies shall not be interchanged after glass bedding process has been completed. Stock liners are bedded with the stocks. The rear legs of the receiver shall have an equal bearing on the recoil shoulders of the stock liner.

The stock shall be free from contact with the barrel.

Stock ferrule shall not contact lower portion of front band longitudinally. There shall be 1/64" minimum clearance. Vertically, the stock ferrule shall contact the front band.

The stock shall have a clearance in the area between rear of receiver bedding surface and receiver rail bedding surfaces.

Clamping of the trigger guard shall have a definite resistance at a distance of ⅜ ± ⅛ inch from the full lock position.

Gas cylinder shall fit tightly on the barrel "power" diameter and the splines. There shall be no rotational movement of the gas cylinder.

Gas cylinder shall be brought forward against the lock before tightening the gas cylinder plug. The gas cylinder plug shall be tightened to 15 ft. lbs. ± 2 pounds torque.

In assembly, the gas cylinder lock shall be hand tightened against shoulder on the barrel within a range of slightly beyond the 6 o'clock position but not in excess of 210° (1 o'clock) past the 6 o'clock position. The gas cylinder lock shall then be "backed off" the minimum distance necessary to align with the gas cylinder at the 6 o'clock position.

Bore diameter shall be .300 + .001. Groove diameter shall be .3075 + .0010. Any taper of the bore shall be within dimensional limits and be diminishing from breech to muzzle. The barrel muzzle shall be crowned – concentric with bore (90° included angle) to remove burrs.

The barrel shall be line straightened to meet the requirements of optical straightness gage.

The operating rod assembly shall function, of its own weight, freely, and without binding during a simulated firing cycle with the operating rod spring removed.

The trigger pull required to release the hammer shall be smooth, free from "creep", and within the limits of four and one-half to six pounds. Functional surfaces of hammer, trigger and sear may have phosphate coating removed by polishing.

Aperture assemblies 1005-864-2926 & 1005-864-2928 produce ½ minute change of elevation by 180° rotation of the aperture. Aperture assembly (standard) shall have an eyepiece with an .0595 peep hole. Aperture assembly (alternate) shall have an eyepiece with an .0520 peep hole.

Threads on windage knob and rear sight base shall be 5/16 – 64 NS-3 to produce ½ minute changes in windage. Elevation and windage knobs shall have free movement independent of each other, with definite clicking action and positive retention. Elevation knob must be at 100 meter setting when elevated 8 clicks from lowest position.

Top of front sight blade shall be square with side and all edges and corners shall be sharp to .003 R. Max. Front sight shall be sharp and square and shall not overhang the sides of the gas cylinder.

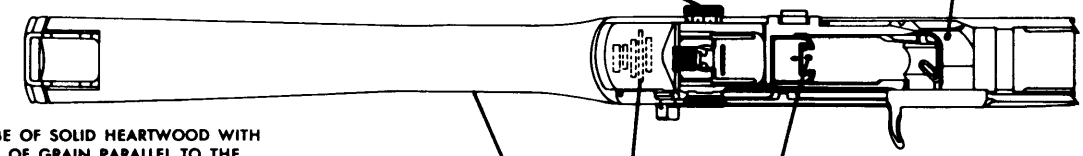
The flash suppressor shall be fastened securely to the barrel by the flash suppressor nut which in turn shall be fastened securely by a set screw. There shall be no rotational or longitudinal movement when examined manually. After assembly, a two diameter concentric plug shall be inserted in the muzzle of the flash suppressor and shall enter the barrel a minimum of 2.5 inches without binding in the flash suppressor.

The selector shaft, sear release, selector lock, and receiver sear release lug are permanently welded to eliminate full automatic capability.

Headspace, with component bolt, shall be from 1.6355 to 1.6385.

National Match identification marks for complete rifle shall consist of the letters "NM" following rifle identification on the receiver, and the letters "NM" approximately ⅛ inch high inscribed on the barrel approximately midway between the front hand guard and front sight.

ESSENTIAL POINTS AND AREAS OF NATIONAL MATCH M14 RIFLE



PRICK PUNCH RECEIVER AFTER PROOF FIRING

REAR SIGHT SCREW SHALL BE TIGHTENED WITHIN 20 TO 25 INCH LBS.

SIGHT MUST BE FREE OF EXCESS OIL.

SIGHT MARKINGS MUST BE DISTINCT.

REAR SIGHT BASE WILL ALSO ACCEPT STANDARD (WITHOUT HOOD) APERTURES.

STOCK SHALL BE OF SOLID HEARTWOOD WITH THE DIRECTION OF GRAIN PARALLEL TO THE LONGITUDINAL AXIS OF STOCK.
STOCKS SHALL BE HEAVY IN WEIGHT.
STOCKS SHALL HAVE NO OPEN GRAIN WHICH MIGHT SWELL EXCESSIVELY IN HIGH HUMIDITY.
PROTECTIVE FINISH (CHINAWOOD) TUNG OIL.

PRICK PUNCH BOLT AFTER PROOF FIRING.

"NM" ENGRAVED ON RECEIVER

RECEIVER, STOCK LINER, AND TRIGGER HOUSING ASSEMBLY GLASS BEDDED AND CUSTOM FITTED TO STOCK. THE STOCK ASSEMBLY AND THE TRIGGER HOUSING ASSEMBLY SHALL BE IDENTIFIED WITH LAST FOUR DIGITS OF THE RECEIVER SERIAL NUMBER. THESE ASSEMBLIES SHALL NOT BE INTERCHANGED AFTER GLASS BEDDING PROCESS HAS BEEN COMPLETED.

THE REAR LEGS OF THE RECEIVER HAVE AN EQUAL BEARING ON THE RECOIL SHOULDERS OF THE STOCK LINER.

WITH OPERATING ROD SPRING AND GUIDE REMOVED: OPERATING ROD SHALL OPEN BOLT WITHOUT MANUAL ASSISTANCE WHEN MUZZLE IS ELEVATED AT A 60° ANGLE, AND SHALL CLOSE WITHOUT MANUAL ASSISTANCE WHEN DEPRESSED AT A 60° ANGLE.

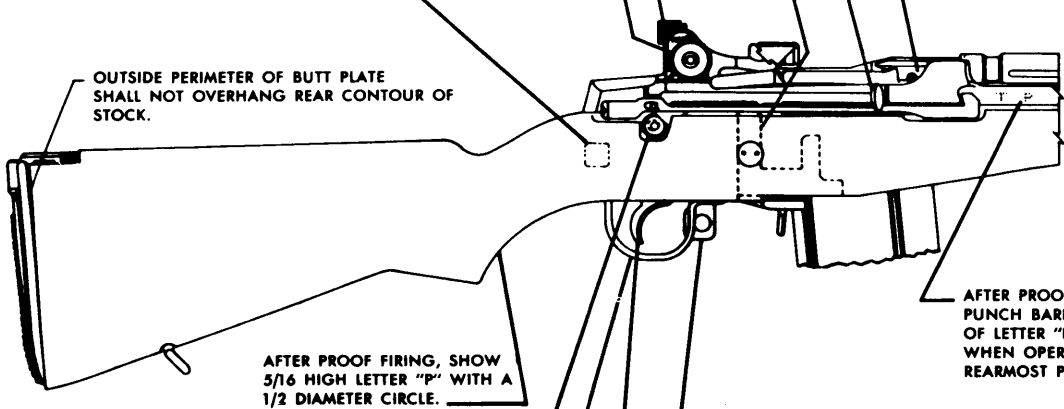
APERTURE ASSEMBLIES SHALL BE USED TO PRODUCE ½ MINUTE CHANGE OF ELEVATION BE 180° ROTATION OF THE EYEPIECE. APERTURE ASSEMBLY 7791133 SHALL HAVE AN EYEPIECE WITH AN .0595 PEEPHOLE. APERTURE ASSEMBLY 7791282 SHALL HAVE AN EYEPIECE WITH AN .0520 PEEP HOLE.

THREADS ON WINDAGE KNOB AND REAR SIGHT BASE SHALL BE 5/16 - 64 NS-3 TO PRODUCE 1/2 MINUTE CHANGES IN WINDAGE. ELEVATION AND WINDAGE KNOBS SHALL HAVE FREE MOVEMENT INDEPENDENT OF EACH OTHER, WITH DEFINITE CLICKING ACTION AND POSITIVE RETENTION.
ELEVATION KNOB MUST BE AT 100 METER SETTING WHEN APERTURE IS ELEVATED 8 CLICKS FROM LOWEST POSITION.

APPLY DEPT OF DEFENSE COMPLETE INSPECTION APPROVAL STAMP, IN POSITION INDICATED, TO RIFLES PASSING FINAL ORDNANCE INSPECTION. (½ HIGH, LEFT HAND SIDE)

HEADSPACE 1.6355—1.6385

OUTSIDE PERIMETER OF BUTT PLATE SHALL NOT OVERHANG REAR CONTOUR OF STOCK.



AFTER PROOF FIRING, PRICK PUNCH BARREL WITHIN LOOP OF LETTER "P" EXPOSED WHEN OPERATING ROD IS IN REARMOST POSITION.

AFTER PROOF FIRING, SHOW 5/16 HIGH LETTER "P" WITH A 1/2 DIAMETER CIRCLE.

SAFETY SHALL HAVE UNRESTRICTED MOVEMENT WITH POSITIVE RETENTION IN LOCKING OF HAMMER AND FREE MOVEMENT OF HAMMER WHEN SAFETY IS RELEASED.

SELECTOR SHAFT LOCK WELD SOFTNESS OF LOCK AFTER WELDING IS PERMISSIBLE.

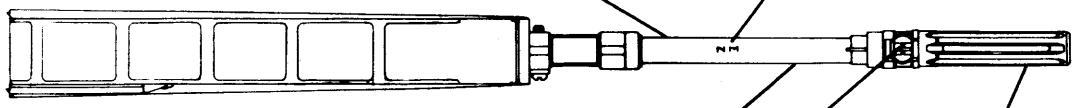
CLAMPING OF THE TRIGGER GUARD SHALL HAVE A DEFINITE RESISTANCE AT A MINIMUM DISTANCE OF 3/8 INCH FROM THE FULL LOCK POSITION.

TRIGGER PULL 4-1/2 TO 6 LBS AND FREE FROM "CREEP."

STRAIGHTNESS OF THE BARREL SHALL MEET THE REQUIREMENTS OF OPTICAL STRAIGHTNESS GAGE F7319275. A SELF ALIGNING EXPANSION PLUG, 3 INCHES LONG WITH A PILOT DIAMETER OF .2993—.0001 WHICH FITS AND ALIGNS ITSELF IN THE BORE AT THE MUZZLE END AND CHECKS FROM THE BORE CENTERLINE. THE MAXIMUM ALLOWABLE DEVIATION FROM THAT CENTERLINE SHALL NOT EXCEED 0°2'23" THROUGHOUT THE LENGTH OF BORE.

BORE DIAMETER SHALL BE .300+.001.
GROOVE DIAMETER SHALL BE .3075+.0010.

IDENTIFICATION MARK SHALL CONSIST OF THE LETTERS "NM" APPROXIMATELY 1/8 INCH HIGH INSCRIBED ON THE BARREL APPROXIMATELY MIDWAY BETWEEN THE FRONT HAND GUARD AND FRONT SIGHT.



ANY TAPER OF THE BORE SHALL BE WITHIN DIMENSIONAL LIMITS AND BE DIMINISHING FROM BREECH TO MUZZLE.

THE BARREL MUZZLE SHALL BE CROWNED — CONCENTRIC WITH BORE (90° INCLUDED ANGLE) TO REMOVE BURRS.

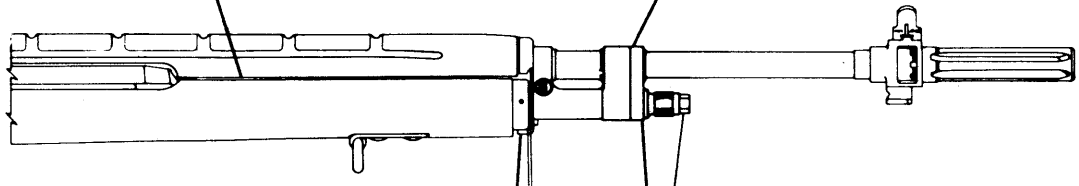
TOP OF FRONT SIGHT BLADE SHALL BE SQUARE WITH SIDE AND ALL EDGES AND CORNERS SHALL BE SHARP TO .003R MAX. FRONT SIGHT SHALL BE SHARP AND SQUARE AND SHALL NOT OVERHANG THE SIDES OF THE FLASH SUPPRESSOR. WIDTH OF THE BLADE AT THE REAR SHALL BE .065-.005.

THE FLASH SUPPRESSOR SHALL BE FASTENED SECURELY TO THE BARREL BY THE FLASH SUPPRESSOR NUT WHICH IN TURN SHALL BE FASTENED SECURELY BY A SET SCREW. THERE SHALL BE NO ROTATIONAL OR LONGITUDINAL MOVEMENT WHEN EXAMINED MANUALLY. AFTER ASSEMBLY, A TWO DIAMETER CONCENTRIC PLUG HAVING DIAMETERS OF .329 AND .2993 SHALL BE INSERTED IN THE MUZZLE OF THE FLASH SUPPRESSOR AND SHALL ENTER THE BARREL A MINIMUM OF 2.5 INCHES WITHOUT BINDING IN THE FLASH SUPPRESSOR.

GAS CYLINDER SHALL FIT TIGHTLY ON THE BARREL "POWER" DIAMETER AND ON THE SPLINES. THERE SHALL BE NO ROTATIONAL MOVEMENT OF THE GAS CYLINDER.

ALIGNMENT OF FRONT AND REAR BARREL HOLES IN GAS CYLINDER SHALL MEET REQUIREMENTS OF GAGE 7796036.

THE STOCK SHALL BE FREE FROM CONTACT WITH THE BARREL. THE HAND GUARD SHALL NOT CONTACT THE STOCK.



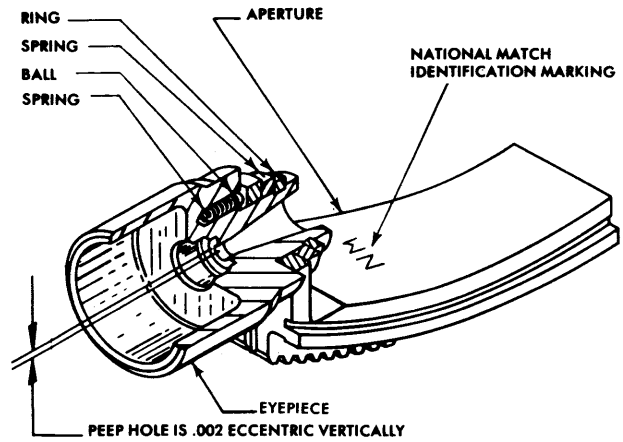
PLUG SHALL BE TIGHTENED WITH 15 FT LBS ± 2 TORQUE.

THE STOCK FERRULE SHALL CONTACT LOWER BAND.

1/64 MIN. CLEARANCE BETWEEN STOCK FERRULE AND FRONT BAND.

GAS CYLINDER LOCK SHALL BE HAND TIGHTENED AGAINST SHOULDER ON THE BARREL WITHIN A RANGE BEYOND THE 6 O'CLOCK POSITION, BUT NOT IN EXCESS OF 210° (1 O'CLOCK) PAST THE 6 O'CLOCK POSITION. THE GAS CYLINDER LOCK SHALL THEN BE "BACKED OFF" THE MINIMUM DISTANCE NECESSARY TO ALIGN WITH THE GAS CYLINDER AT THE 6 O'CLOCK POSITION. GAS CYLINDER SHALL BE BROUGHT FORWARD AGAINST THE LOCK BEFORE TIGHTENING THE GAS CYLINDER PLUG.

SIGHTS



The two aperture assemblies are identical except for the eyepieces which have different peep hole diameters. The aperture with .0595 peep hole will be installed as standard with the .0520 diameter aperture available as an alternate.

The hooded eyepiece is designed to eliminate glare and reflections on the sight aperture, and to provide ½ minute changes in elevation.

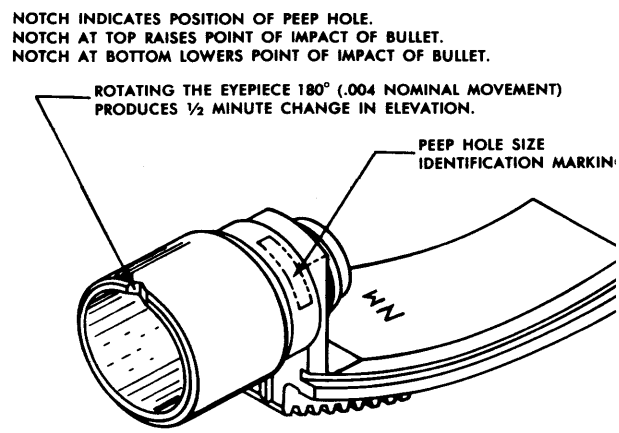
Each eyepiece is selectively fitted and matched with its individual aperture. It should not be attempted to disassemble the aperture assembly or to change eyepieces on an aperture. Each aperture assembly is selectively fitted and matched to the rear sight base.

The peep hole is .002" vertically eccentric with other diameters of the eyepiece. Rotating the eyepiece 180° clockwise or counter-clockwise raises and lowers the line of sight. Two spring loaded balls in the eyepiece engage a vertical "v" notch in the face of the aperture to retain the eyepiece in each position. The position of the eyepiece is indicated by a notch at the rear face of the eyepiece.

Each click of the elevation knob gives a change of 1 minute. Rotating the eyepiece so that the indicator notch is at the top, moves the point of impact of the bullet up ½ minute. Rotating the indicator notch to the bottom, point of impact of the bullet will be moved down ½ minute.

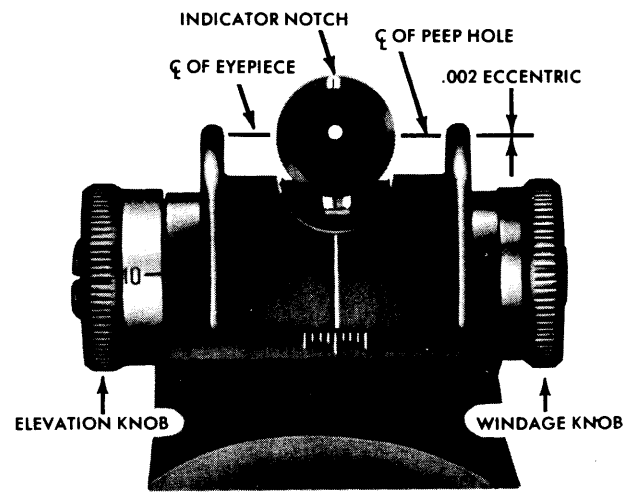
The National Match sight base marked NM/2A is undercut to accept the hooded eyepiece. The change from 32 to 64 threads per inch of this sight base and of the windage knob produce a ½ minute change in windage for each click of the knob. Thus the 1967 National Match rifle is capable of ½ minute sight changes for both windage and elevation.

The National Match front sight has a blade width of .065 minus .005, and is identified by the letters "NM" and the numbers "062" on its right side.



APERTURE ASSEMBLY STOCK NO. 1005-864-2926
(.0595 PEEP HOLE)

APERTURE ASSEMBLY STOCK NO. 1005-864-2928
(.0520 PEEP HOLE)



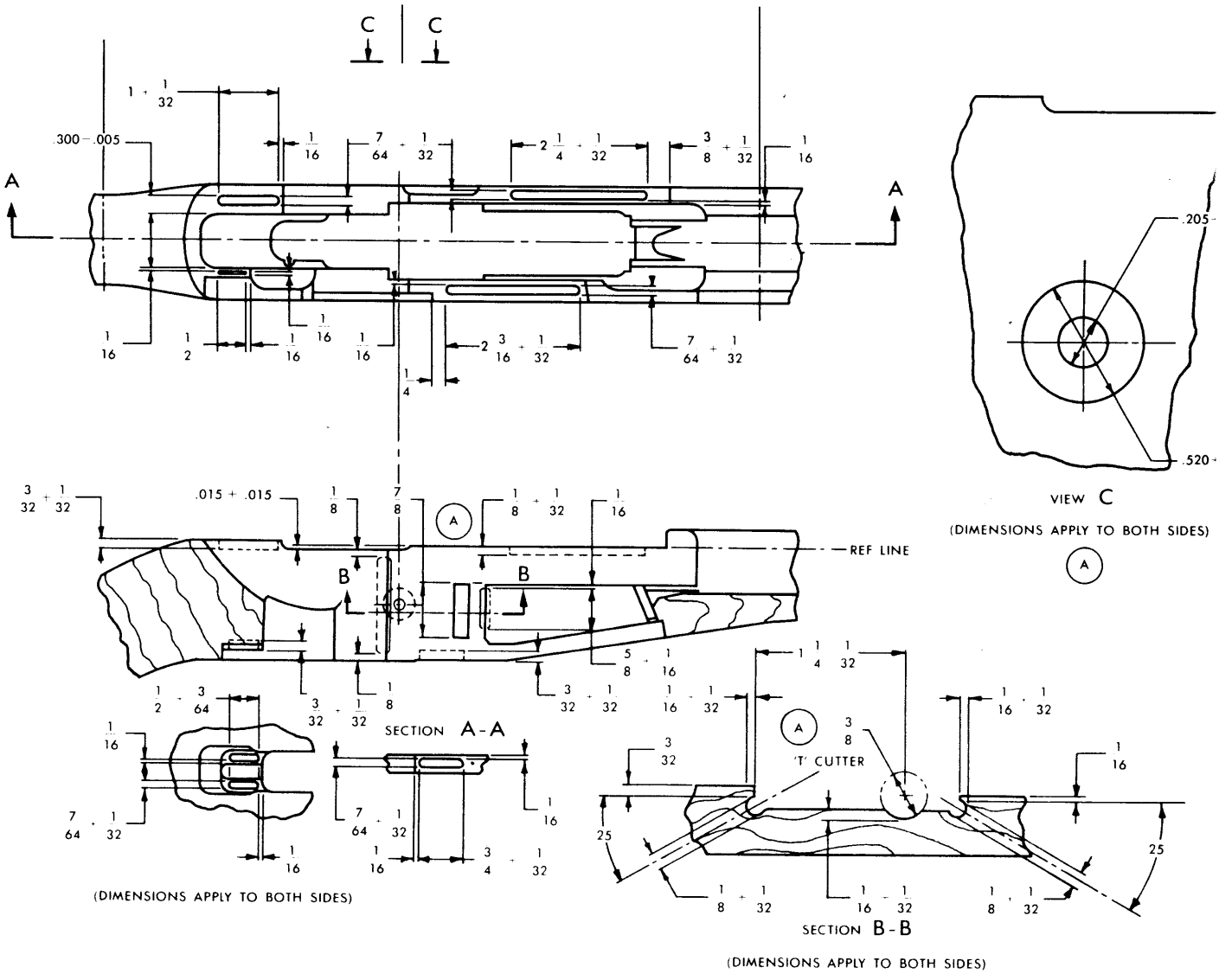
GLASS BEDDING

Awareness of the advantages and the principles of rifle stock bedding were realized in the early 1880's by a Springfield Armory specialist on military rifles. Uniform hand fitted stock bedding was applied to the 1903 National Match Rifle.

Today, the principles of stock bedding have been standardized in the National Match Weapons by employing fiberglass and resin compound better known as "glass bedding."

The M14 National Match Rifle action is glass bedded precisely, mating the stock assembly and related parts, thereby enhancing the accuracy of the rifle.

The procedures used in bedding the 1967 M14 National Match Rifle are described on the following sheets.



ROUTED STOCK, M14 NM

INSTRUCTIONS FOR GLASS BEDDING

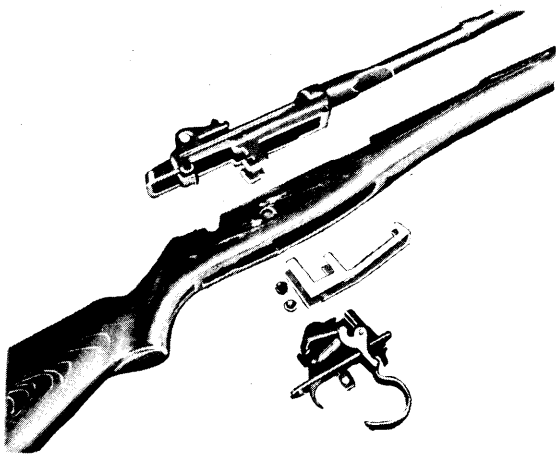


FIGURE 1

THE ABOVE ASSEMBLIES ARE USED IN GLASS BEDDING PROCESS.

IMPORTANT: THE STOCK ASSEMBLY AND FIRING MECHANISM SHALL BE IDENTIFIED WITH THE LAST FOUR DIGITS OF RECEIVER SERIAL NUMBER. THESE COMPONENTS SHALL BE KEPT TOGETHER THROUGHOUT THE GLASS BEDDING PROCESS.

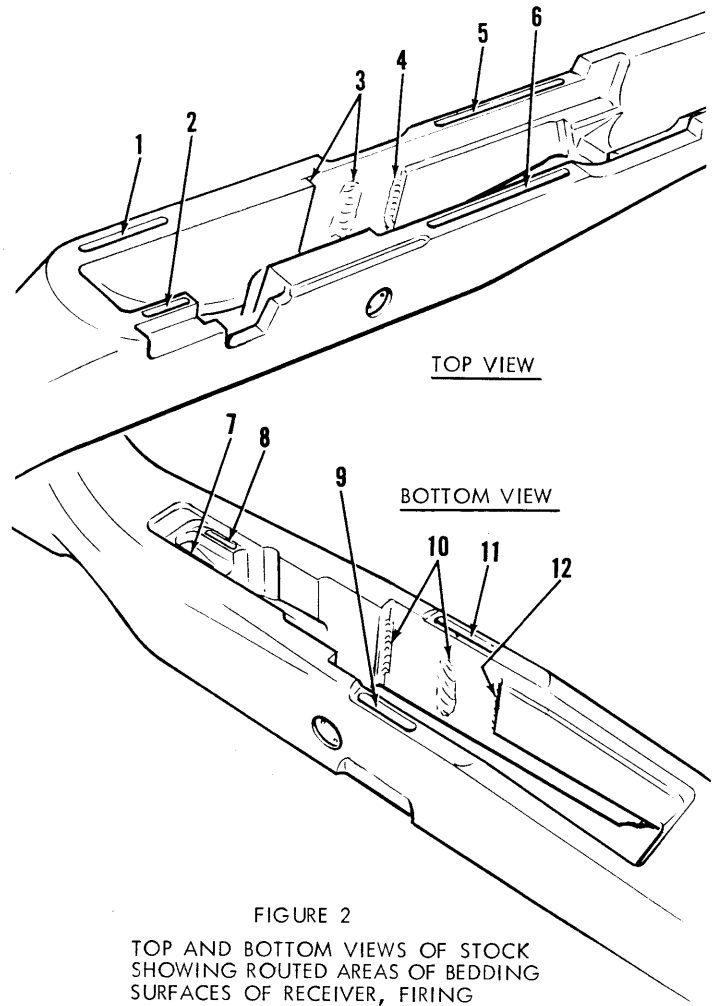


FIGURE 2

TOP AND BOTTOM VIEWS OF STOCK SHOWING ROUTED AREAS OF BEDDING SURFACES OF RECEIVER, FIRING MECHANISM, AND LINER.

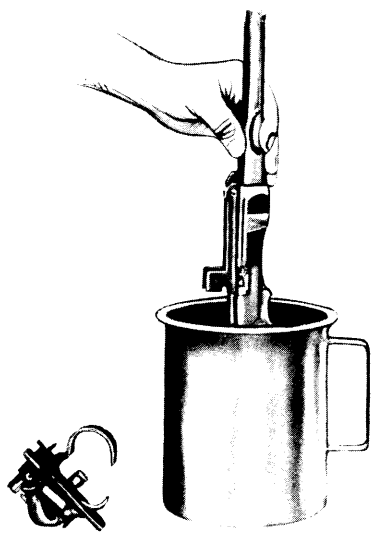


FIGURE 3

BEFORE STARTING BEDDING PROCESS, DEGREASE RECEIVER, FIRING MECHANISM, LINER AND LINER SCREWS. THESE COMPONENTS MUST BE CLEAN.

DIP AND COMPLETELY SUBMERGE THE RECEIVER AND FIRING MECHANISM INTO THE RELEASE COMPOUND AND ALLOW TO AIR DRY. DIP A SECOND TIME AND AGAIN ALLOW TO AIR DRY.

NOTE: DO NOT APPLY RELEASE COMPOUND TO LINER OR SCREWS.

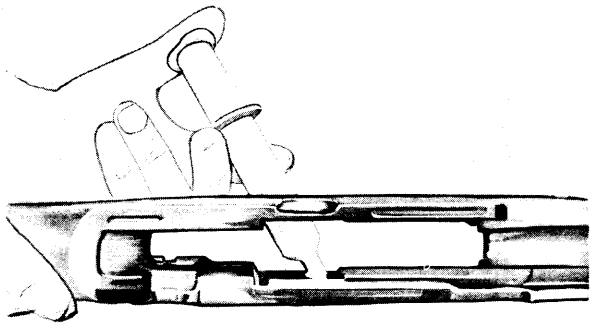


FIGURE 4

FILL INSIDE ROUTED AREAS 3, 4, 10, & 12 WITH BEDDING COMPOUND. PROVIDE EXCESS MATERIAL TO ASSURE COMPLETE SURFACE BEDDING.

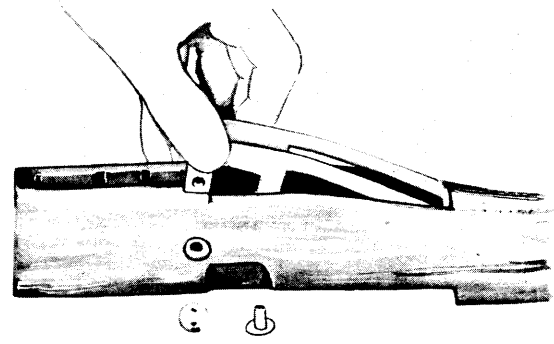


FIGURE 5

INSTALL LINER IN STOCK CAVITY.

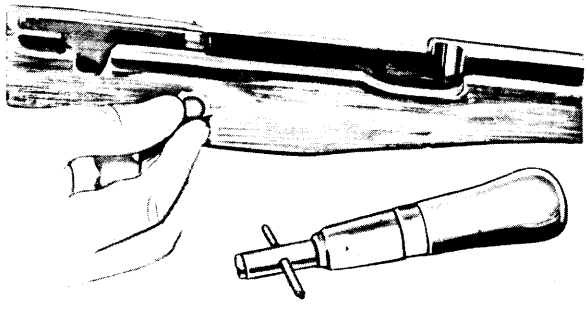


FIGURE 6

TIGHTEN SCREWS SLIGHTLY ALLOWING FOR FINAL TIGHTENING AFTER COMPLETE ACTION HAS BEEN ADJUSTED. MAKE SURE BEDDING COMPOUND IS VISIBLE AROUND SCREW AND IN WRENCH HOLES.

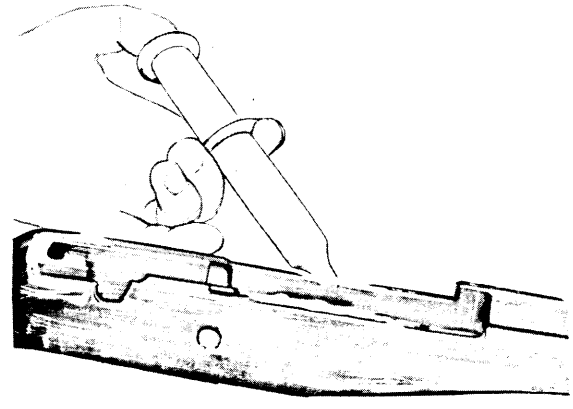


FIGURE 7

APPLY BEDDING COMPOUND TO TOP ROUTED AREAS 1, 2, 5 & 6. PROVIDE EXCESS MATERIAL TO ASSURE COMPLETE SURFACE BEDDING.

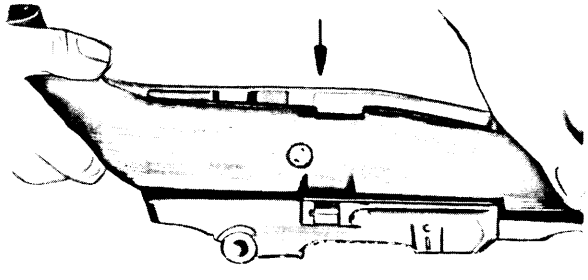


FIGURE 8

ASSEMBLE STOCK TO BARREL AND RECEIVER ASSEMBLY IN A VERTICAL DIRECTION AS SHOWN.

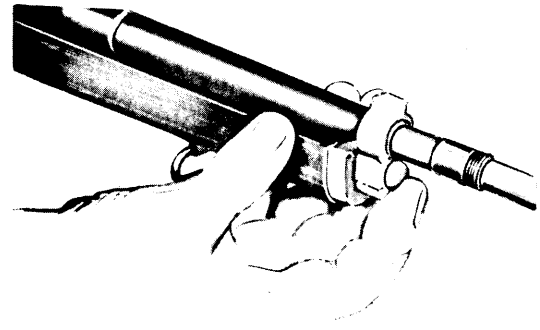


FIGURE 9

INSTALL BARREL LOCATING FIXTURE. (SEE FIGURE 17)

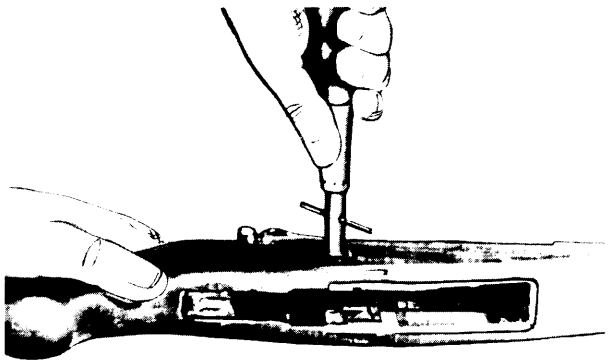


FIGURE 10

TAP BUTT END OF STOCK TO ASSURE PROPER SEATING OF RECOIL LEGS OF RECEIVER AGAINST RECOIL SURFACES OF LINER. FINALLY TIGHTEN LINER SCREWS SECURELY. CLEAN ALL EXCESS COMPOUND FROM INSIDE SURFACES. WIPE INSIDE SURFACES WITH CLOTH DAMPENED WITH CLEANING SOLVENT (CARBITOL).

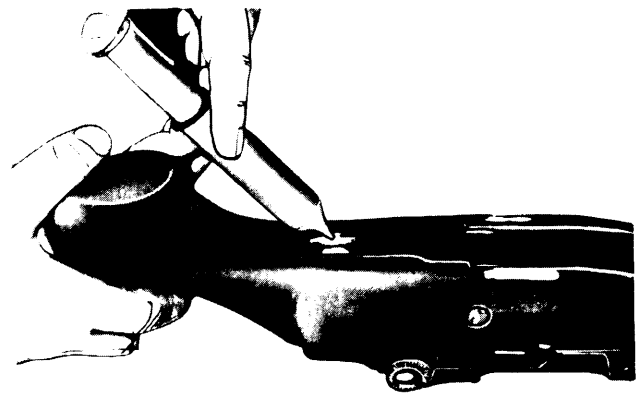


FIGURE 11

APPLY BEDDING COMPOUND TO BOTTOM ROUTED AREAS 7, 8, 9 & 11. PROVIDE EXCESS MATERIAL TO ASSURE COMPLETE SURFACE BEDDING.

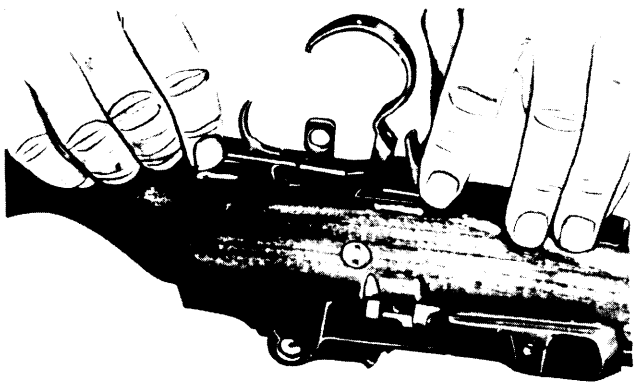


FIGURE 12

ASSEMBLE THE FIRING MECHANISM INTO THE STOCK

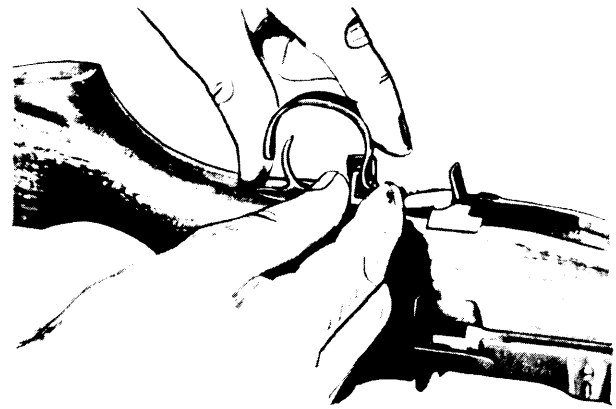
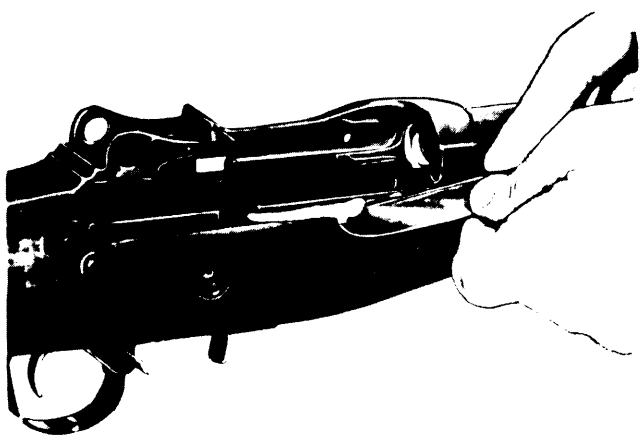


FIGURE 13

ROTATE THE TRIGGER GUARD AND ADJUST TO WITHIN 3/8 INCH OF FULL LOCK POSITION. INSTALL U-LOCK (SEE FIGURE 18) TO HOLD IN THIS POSITION.



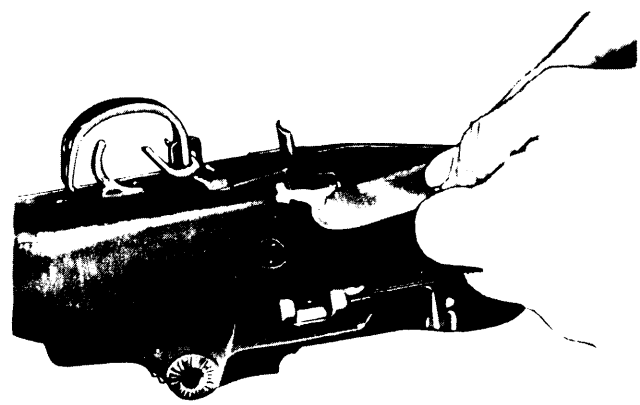


FIGURE 14

REMOVE EXCESS BEDDING COMPOUND FROM TOP AND BOTTOM AFTER ACTION IS CLAMPED AS SHOWN IN FIGURE 13.

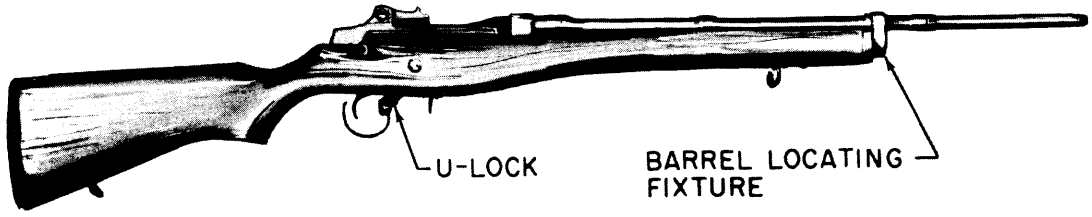


FIGURE 15

COMPLETELY BEDDED RIFLE ACTION WITH BARREL LOCATING FIXTURE AND U-LOCK IN PLACE. THE BEDDED ACTION SHOULD BE ALLOWED TO AIR DRY FOR A MINIMUM OF 8 HOURS.

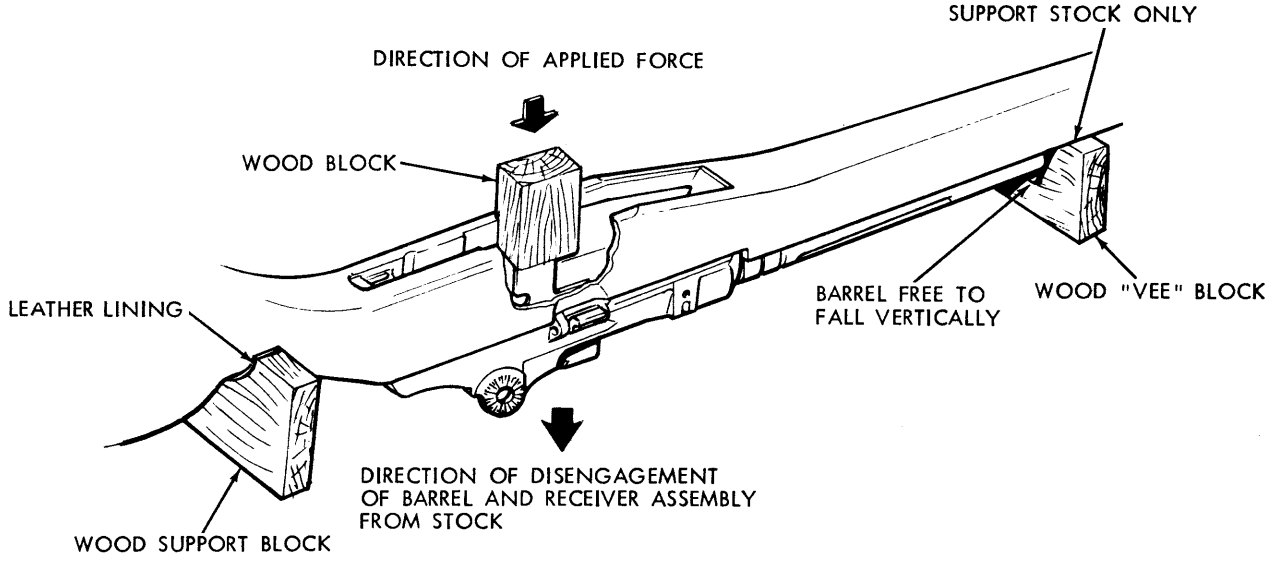


FIGURE 16

AFTER ACTION HAS BEEN ALLOWED TO DRY, REMOVE FIRING MECHANISM AND BARREL LOCATING FIXTURE. PLACE RIFLE ON BLOCKS AS SHOWN. INSERT BLOCK IN MAGAZINE OPENING AND REST IT ON ENDS OF RECEIVER RECOIL LEGS. TAP BLOCK TO DISENGAGE BARREL AND RECEIVER ASSEMBLY IN A VERTICAL DIRECTION AS SHOWN.

REMOVE ALL RESIDUAL GLASS BEDDING COMPOUND FROM STOCK. NOTE: DO NOT REMOVE THE SOLIDIFIED GLASS BEDDING COMPOUND CONTAINING THE MOLDED IMPRESSIONS OF THE RECEIVER AND FIRING MECHANISM BEDDING SURFACES.

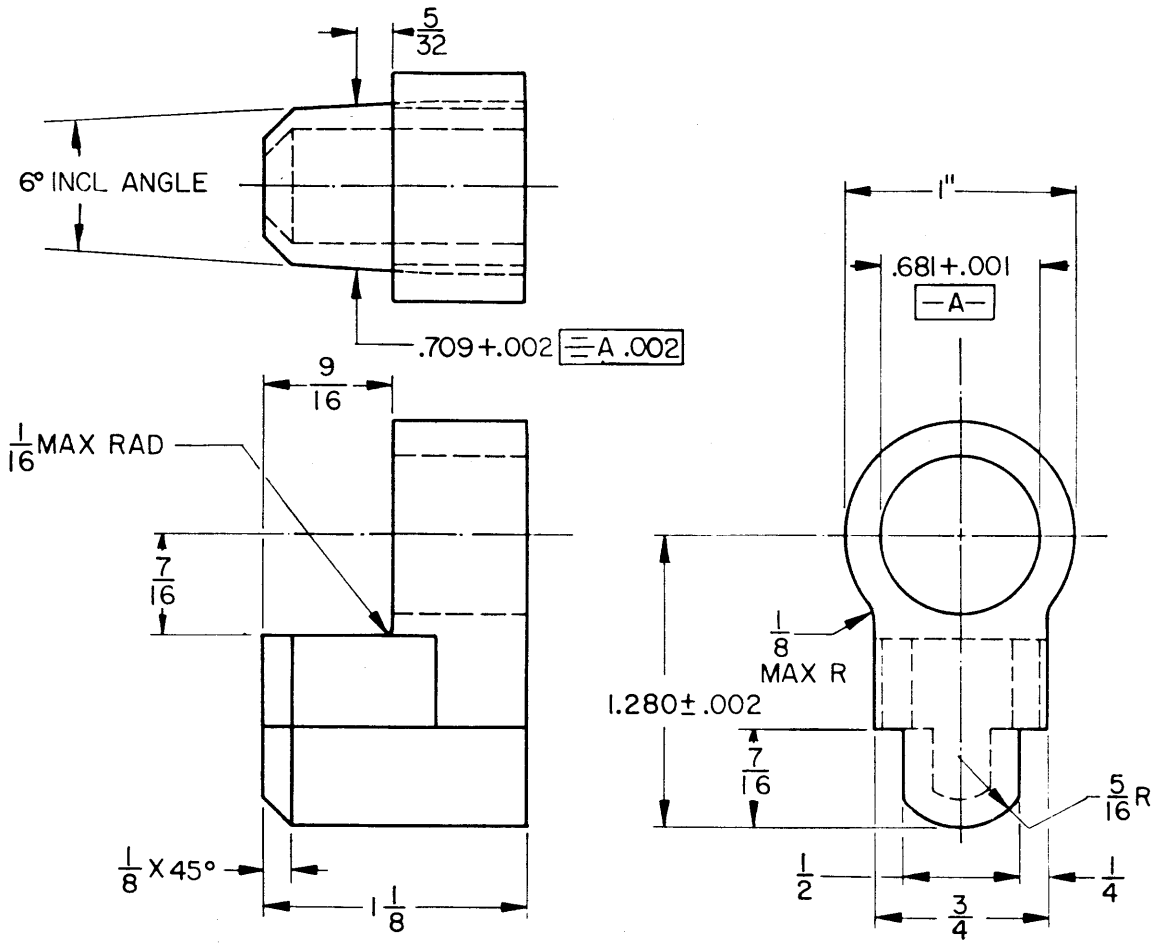


FIGURE 17 BARREL LOCATING FIXTURE

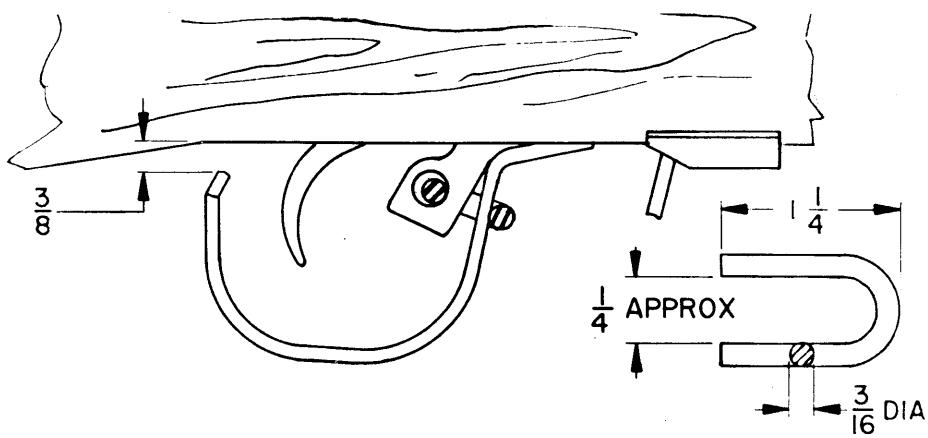


FIGURE 18
CONFIGURATION AND USE OF U-LOCK

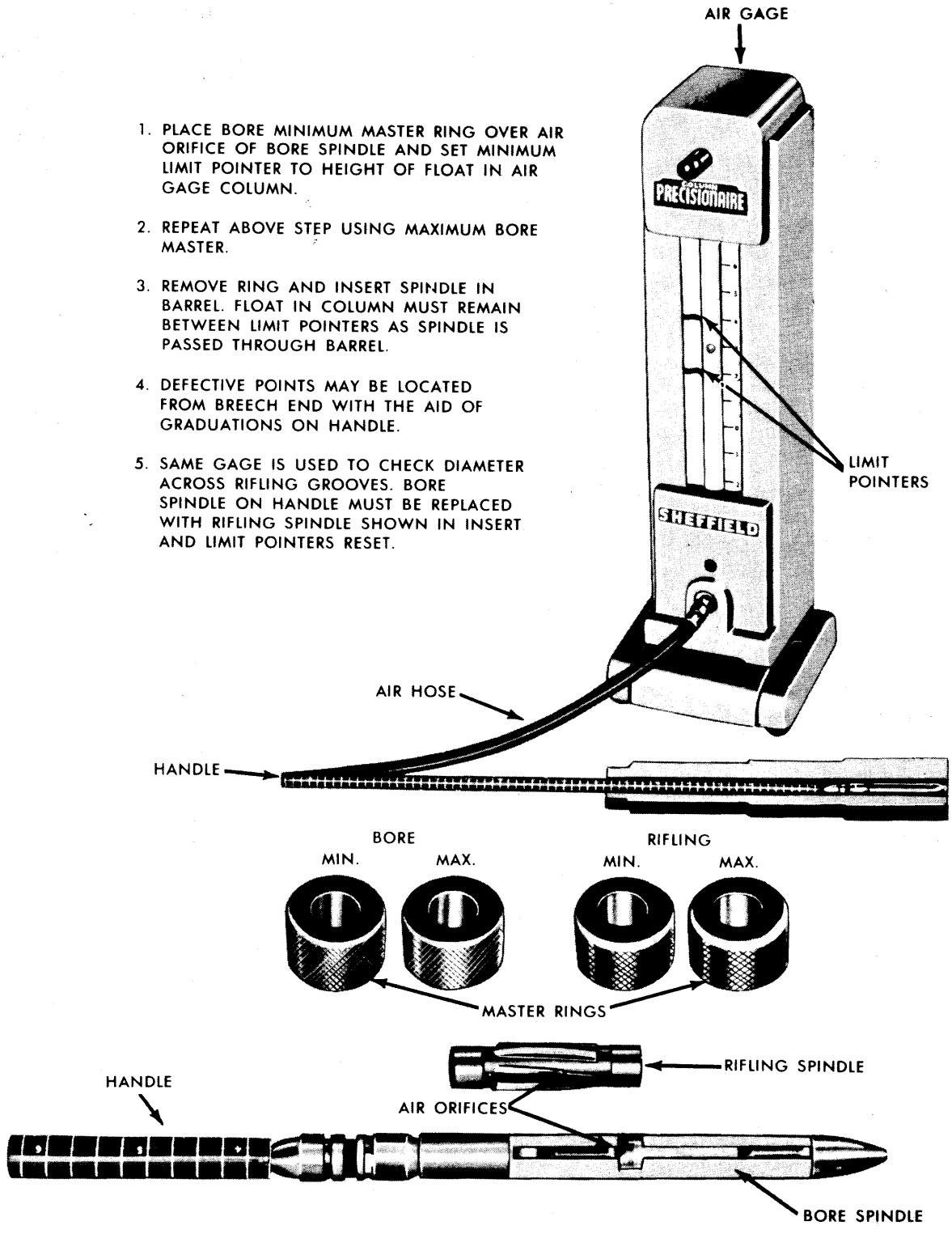
1. PLACE BORE MINIMUM MASTER RING OVER AIR ORIFICE OF BORE SPINDLE AND SET MINIMUM LIMIT POINTER TO HEIGHT OF FLOAT IN AIR GAGE COLUMN.

2. REPEAT ABOVE STEP USING MAXIMUM BORE MASTER.

3. REMOVE RING AND INSERT SPINDLE IN BARREL. FLOAT IN COLUMN MUST REMAIN BETWEEN LIMIT POINTERS AS SPINDLE IS PASSED THROUGH BARREL.

4. DEFECTIVE POINTS MAY BE LOCATED FROM BREECH END WITH THE AID OF GRADUATIONS ON HANDLE.

5. SAME GAGE IS USED TO CHECK DIAMETER ACROSS RIFLING GROOVES. BORE SPINDLE ON HANDLE MUST BE REPLACED WITH RIFLING SPINDLE SHOWN IN INSERT AND LIMIT POINTERS RESET.



BORE DIAMETER AIR GAGE

INSPECTION

BARREL BORE DIAMETER

The Arsenal uses air gages to accurately measure and control bore diameters of the National Match rifle. Such a gage is illustrated on page 13. A constant flow of air passes through the gage and out of the orifices in the spindles. If the bore diameter is restricted, not much air escapes out of the orifices and the float rides higher in the air column. If the bore is large, there is more space over the orifices for air to escape and the pressure is lowered, allowing the float to drop. As the spindle is traversed through the barrel, readings may be made of the diameter at any point thus checking the uniformity of the barrel land and groove diameters from end to end. These air gages are extremely sensitive and permit measurements of diameters to an accuracy of .0001 inch variation.

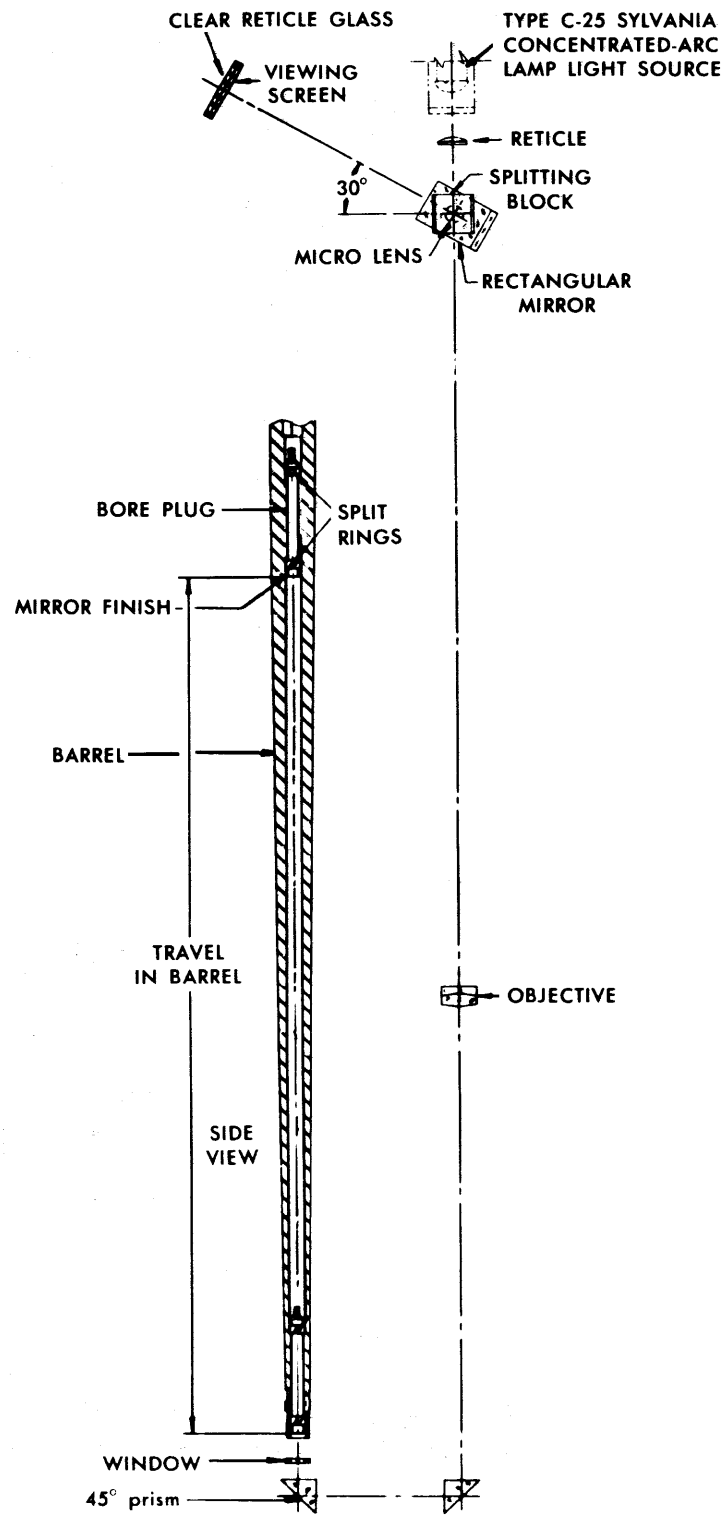
The handle is graduated in inches so that the bore and groove diameters may be recorded at any point along the barrel's length. Bores which are within dimensional limits, but taper slightly from the breech to the muzzle end, are passed. **On the other hand, a bore which is larger at the muzzle than at the breech end is rejected. The last four inches at the muzzle end is held to particularly close tolerances.**

BARREL STRAIGHTNESS

Lack of barrel straightness has been found to be the major cause of targeting rejects at Rock Island Arsenal, because the groups are too far off from the sight setting.

However, in relation to accuracy, or the ability of weapon to place shots consistently within a given area without regard to sight alignment, barrel straightness is not as important.

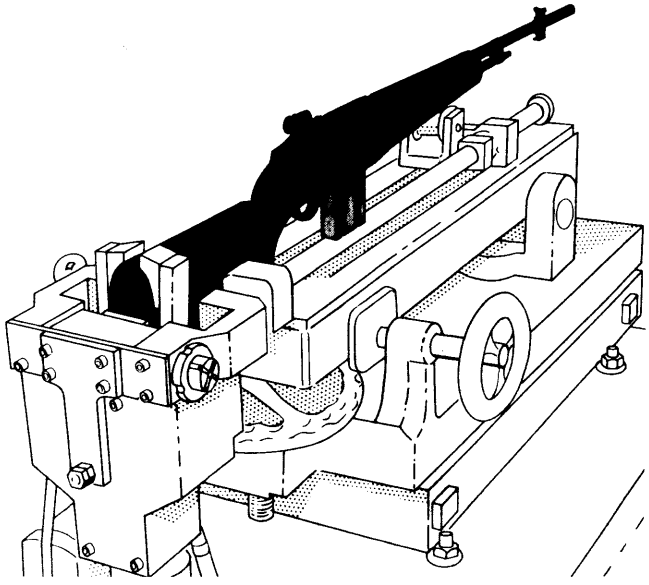
The Arsenal has developed an optical instrument for determining straightness. This instrument is capable of measuring straightness within .0002 slope units of angular movement or 42 seconds. As the mirrored plug is traversed through the barrel bore by a handwheel, the image of the reticle is reflected through the prism system to the screen. Each barrel is checked for straightness using this instrument. Requirements are that throughout the bore length, the screen shall not show a deviation greater than 0° 2' 23".



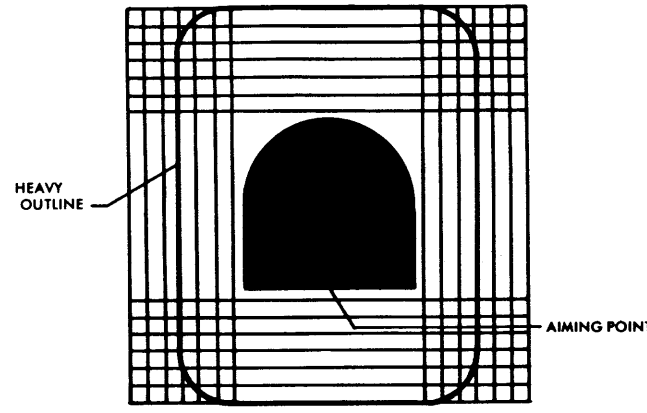
SCHEMATIC OF OPTICAL STRAIGHTNESS GAGE

ACCURACY MOUNT

The pneumatic mount shown below is used by the Arsenal as the standard machine rest to target and accuracy check all production National Match rifles. In this firing fixture, the weapon is positioned on a cushion locator at the rear bottom of stock and on a V-Block near front end of stock to the rear of sling swivel. Two steel jaws, lined with rubber cushions are pneumatically operated to rigidly clamp and hold the weapon in position for firing. The weapon recoils in firing fixture, under spring tension, and returns to its original position ready to fire the next round.



ACCURACY AND TARGETING FIXTURE



TARGETING DIAGRAM

FUNCTION FIRING

Prior to targeting and accuracy tests, the rifle is fired 10 rounds for functioning. If malfunctions occur, the rifle is rejected.

During the firing of accuracy and targeting tests (52 rounds), all weapons must function satisfactorily. If malfunctions occur, the rifle is rejected.

PROOF FIRING

Each barrel is subjected to proof firing prior to assembly to the rifle receiver. The barrel shall withstand the firing of one high pressure test cartridge (approximately 70,000 pounds per square inch) without evidence of failure as determined by magnetic particle inspection.

Each completed weapon is proof fired with one round of high pressure test ammunition. After firing, the weapon shall be carefully inspected for evidence of failure. The spent proof-cartridge case is closely examined for bulges, splits, rings or any evidence of other defects. Any defects found will be cause for rejection of the rifle.

Immediately after proof firing the prescribed proof marks shall be placed on each acceptable barrel, bolt, stock and receiver.

TARGETING TESTS

The purpose of the targeting test is to insure that the center of impact of a group fired from the rifle can be centered on the target with adequate adjustments remaining in elevation and windage.

At a range of 100 yards with the rear sight at 8 clicks up from its lowest position and the windage scale at zero, the sights aligned at 6 o'clock on a 5.0 inch bullseye, two shots are fired. If these shots fall right or left of the center of the bull in excess of 5.8 inches, the front sight will be adjusted to bring the shots within limitations.

Targeting information is obtained simultaneously with accuracy firing. These accuracy test groups must fall within a rectangle (heavy outline) 11.6 inches horizontal by 17.6 inches vertical, concentrically centered on the bullseye.

ACCURACY FIRING

With the rifle supported in a machine rest five ten-shot groups are fired at 100 yards for accuracy using match quality ammunition. The average extreme spread of these groups cannot exceed 3.5 inches. Any one ten-shot group making up this average cannot exceed 5.0 inches extreme spread. If these requirements are not met the rifle is rejected.

MAINTENANCE

CLEANING

When non-corrosive ammunition is used it is not imperative that the bore be cleaned after each day's shooting. If fouling accumulates it may be removed with bore cleaner or solvent. In damp weather a light coat of preservative oil should be left in the bore. Before firing the following day the oil should be removed with dry patches or solvent, and the bore checked for the presence of foreign matter or obstructions. The chamber should be kept clean by using a patch wet with solvent or cleaner on the brush of the chamber cleaning tool. Exterior metal surfaces should be kept clean, and protected with a light coat of preservative oil.

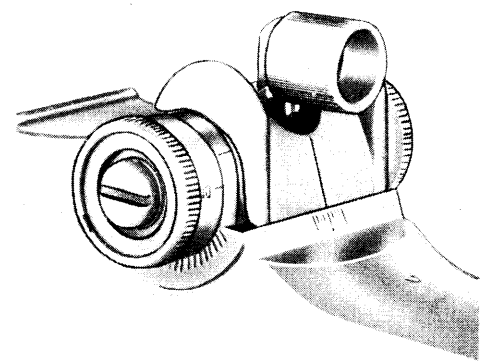
REAR SIGHT

Sight bases marked NM/2A will accept hooded apertures with .0520 or .0595 peep holes, and also standard (unhooded) apertures. A plastic cap will be provided to protect the aperture assembly.

Changing apertures requires disassembling the rear sight mechanism. Extreme care should be used in handling the parts. Both the windage knob and rear sight base have a fine pitch thread. Because of the precision made threads, particular attention should be given the following, prior to, and during assembly:

Insert rear sight base through the opening of the cover.

Place the front lip of cover into the recess at the forward portion of rear sight receiver well. Raise the base slightly, exposing the rear portion of the cover. With a screwdriver, apply pressure to rear of cover in a horizontal direction until the cover snaps into place and is firmly retained by the receiver.



APERTURE REAR SIGHT MECHANISM FOR ½ MINUTE WINDAGE AND ELEVATION

Insert the aperture, or aperture assembly, into the aperture groove in the base and lower until it bottoms against the receiver.

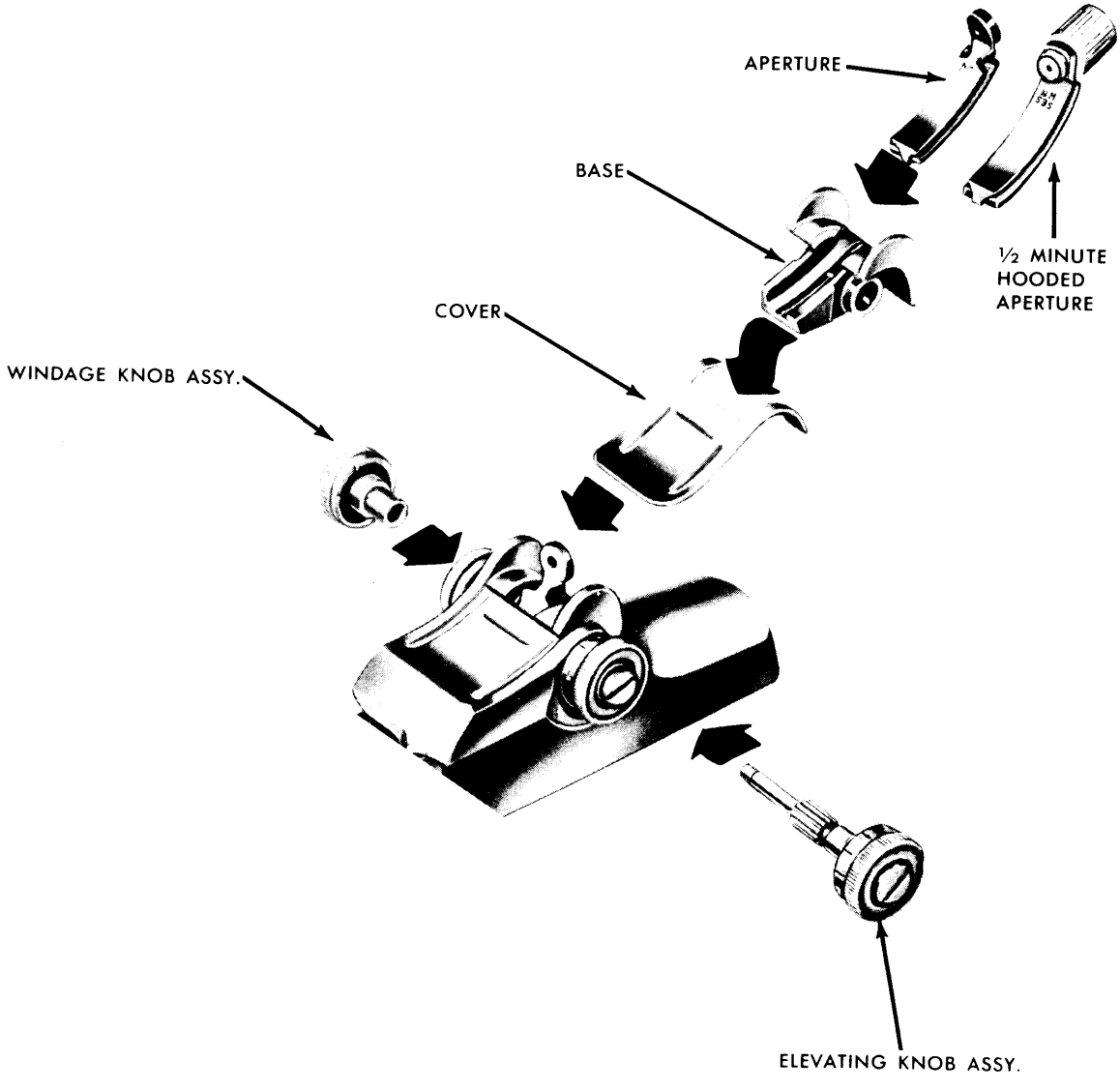
Caution should be exercised in starting windage knob threads into rear sight base to preclude danger of cross threading. Mating threads must be free of excess oil and all foreign matter.

With the left hand, apply pressure to the base forward and to the right of the receiver. Insert and turn windage knob carefully to engage the mating threads. Continue to turn windage knob until the base is tightly seated against the right receiver ear.

Insert pinion of elevating knob assembly through the hole on left side of receiver ear, meshing the pinion teeth with mating teeth of the aperture. Simultaneously align by feel, the flat at the end of pinion shaft with mating contour of the lock, housed in the windage knob. Thread the rear sight nut (in the windage knob) onto the pinion shaft. (Some manipulation of parts may be necessary to permit assembly). Tighten rear sight nut until both elevating and wind-

age knobs become inoperative. By backing off the rear sight nut one or more clicks (one-half turn per click) both knobs will then be operative. The graduation mark on rear sight base can be aligned with graduation mark on the receiver.

Tighten the rear sight screw securely. Settings of various ranges are attained in terms of the number of clicks from the lowest position of the aperture once the sight has been "zeroed" in at the respective ranges. Once sight settings have been established, the rear sight mechanism should be left intact to preserve sight zero.



REAR SIGHT ASSEMBLY FOR M1 AND M14 RIFLES, NM

AMMUNITION

CARTRIDGE, CAL. .30, NATIONAL MATCH, M72

CARTRIDGE, CAL. 7.62MM, NATIONAL MATCH, M118

CARTRIDGE MODELS

Two cartridge models, manufactured expecially for use in competitions, are available for issue in the 1967 National Rifle Matches. Cartridge, Caliber .30, Match, M72 is for use in the M1 rifle and in bolt-action rifles chambered for it. This round is commercially identified as the .30/06. Cartridge, Caliber 7.62mm, Match, M118 is for use in the M14 rifle and in bolt-action rifles chambered for it. The round is identified commercially as the .308 Winchester.

The M72 cartridge is similar to that manufactured for the National Matches prior to World War II. The most significant change is the cartridge manufactured at the present time contains a noncorrosive styphnate primer (primer which on the firing does not leave a residue which causes rust). This reduces the cleaning required to maintain a rust-free bore from that when firing the M1903 rifle in the National Matches prior to World War II.

The M118 cartridge has similar performance characteristics to that of the M72 since it uses the same bullet design and the velocity is only slightly less. However, the case length is about one-half inch shorter. The propellant capacity is reduced and this requires a different propellant charge from that of the M72 in order to produce a high velocity within a safe pressure level.

The M72 and M118 rounds are designed and manufactured to give better accuracy than other caliber .30 and 7.62mm military cartridges. The boat-tail bullet design produces a flatter trajectory and less wind drift. The manufacturing specifications for the match cartridge are significantly more rigid than those for other types of caliber .30 and 7.62mm ball cartridges with respect to accuracy characteristics.

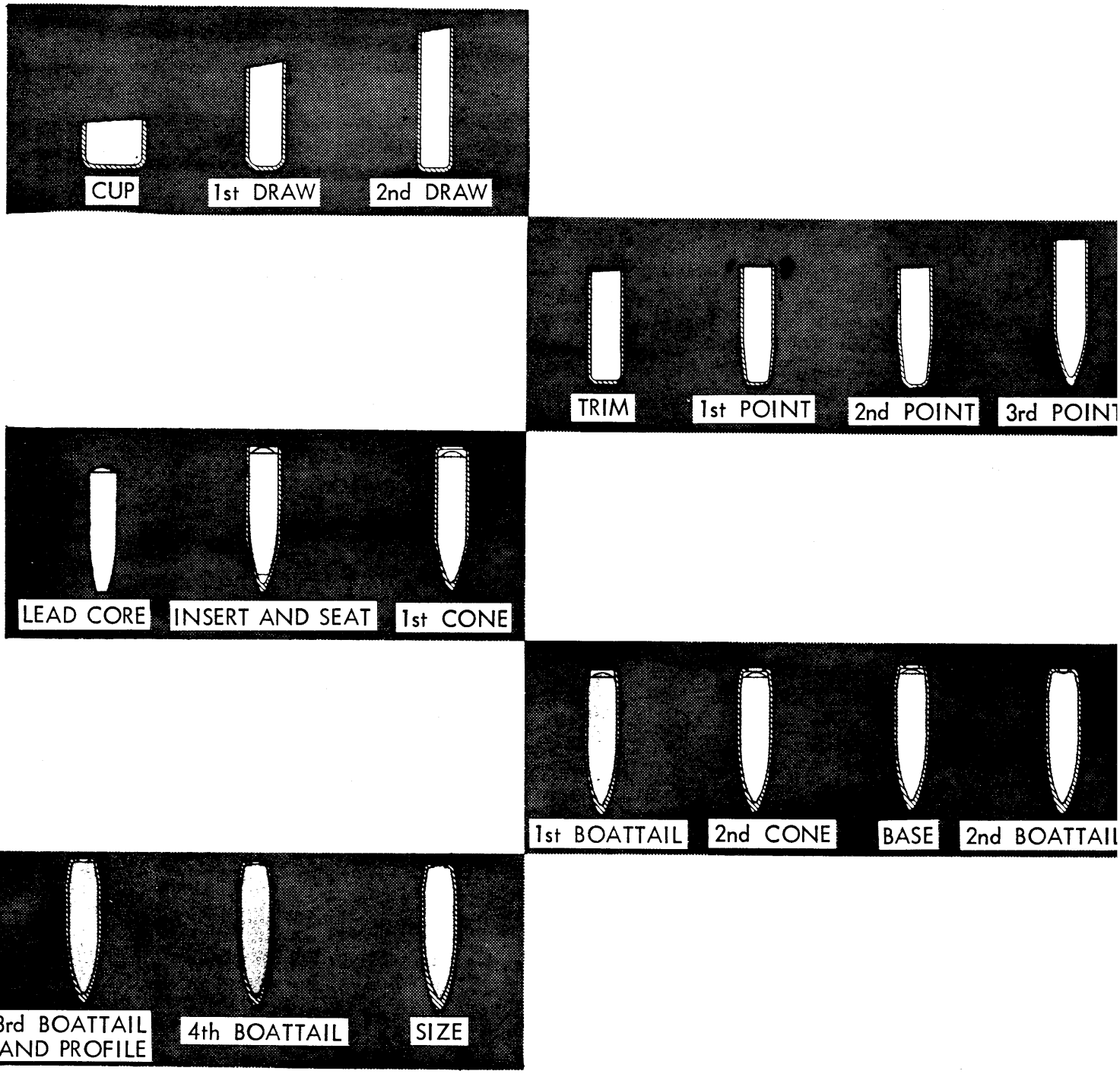
Like other conventional ammunition, the M72 and M118 are composed of a bullet, a case, a primer, and propellant.

BULLET

The bullet is the completed assembly of a gilding metal jacket and a lead core. The homogenous core material consisting of approximately 90% lead and 10% antimony is purchased in 13" long, 4-⅞" diameter ingots weighing approximately 94 lbs. each. This material is extruded on a 1350 ton hydraulic press into wire having a diameter from 0.223 to 0.226 inch. The wire is fed from reels into a machine which forms lead slugs weighing 115.0 $\pm$ 0.2 grains at a rate of 9600 pieces per hour. The bullet jacket is drawn and formed from a metal cup consisting of 90% copper and 10% zinc. This cup is manufactured to specific dimensions and tight tolerances. The jacket is formed from these special cups in two draw operations and is trimmed within a .005 inch tolerance to maintain a jacket weight ranging between 58.5 and 60.0 grains. The trimmed jacket and formed slugs are then assembled on a 14 station, 35 ton capacity press having a production rate of 2800 pieces per hour. The finished bullet has a length ranging from 1.312 – .040 inches and a diameter of 0.3081 to 0.3088 inch and a maximum point diameter of 0.060 inch. The profile has a radius of 2.1 inches and a boat-tail length 0.230 – .005 inch. The bullets are visually inspected prior to assembly into cartridges. Bullets are passed through a weighing machine which has three stations. Bullets having a weight between 172.6 and 174.5 grains are taken off at station 2. Bullets lighter than 172.6 grains are taken off at station 1 and they are scrapped. Bullets heavier than 174.5 grains are collected at station 3 and they are given separate control numbers. The bullets are then inspected visually. The bullets rotate on a chain conveyor under which is a mirror to permit inspecting all surface area of the bullet.

CASE

The case serves several purposes. It secures the bullet, primer and propellant to form one unit; it acts as a cam to guide the cartridge from the magazine into the chamber; and it also acts as an obturator to prevent gas from escaping back into the rifle mechanism. The case is formed from a cup through a series of punch and die draws and annealing operations. The cup is made from brass (70 percent copper and 30 percent zinc) and it must meet weight and grain size requirements. The finished M72 case has a length of 2.494 – .015 inches, a head diameter of 0.473 – .007 inch, an inside



BULLET FOR CALIBER .30 AND 7.62MM NATIONAL MATCH CARTRIDGE

neck diameter of 0.3068 + .0010 inch, and a neck wall thickness of 0.015 – .004 inch. The finished M118 case has a length of 2.015 – .015 inches, head and inside neck diameters similar to those of the M72, and a neck wall thickness of 0.017 – .004 inch. The case head is shaped by smashing it between a punch and die and then smashed again to form the primer pocket and imprint the letters and numerals in the head. The two heading operations harden the brass around the primer to prevent gas leakage and head ruptures during firing. The case is heat treated to obtain a certain grain size and hardness in the varying wall thickness to give good obturation and extraction characteristics. The case wall thickness is greater at the rear because a portion of the case is unsupported by the chamber or bolt at this point.

The front of the case has a smaller wall thickness and it is softer so it will expand against the chamber and prevent gas escaping into the weapon. A primer pocket and a vent hole are formed in the base of the case and an extractor groove is cut into the side of the case just forward of the base. In the final operation the vent hole is pierced and the primer is assembled in the primer pocket. A waterproofing material is applied between the primer and case during this operation. Automatic devices detect cases with no vent hole or an eccentric vent hole, and cases with no primer or an inverted primer. The cases are also subjected to visual inspections.

PRIMER

The primer used in the M72 and M118 cartridges is an assembly consisting of a cup, pellet, and anvil. Also, a paper disc may be used between the anvil and pellet. The cup is formed from annealed-cartridge-brass strip with a thickness of 0.0290 $\pm$ .0005 inch. The finished cup has a diameter of 0.2106 $-$ .0011 inch and a minimum thickness of 0.028 inch at the base. The pellet is assembled in the cup while it is in the plastic state. The pellet is formed by means of a charging plate which has 1020 holes. The pellet has a diameter of 0.1375 + .001 inch in diameter and 0.077 $-$ .001 inch thick. The primer mix is rubbed into the holes in the plate and pellet samples are taken off the production line periodically and weighed to assure a dry weight of 0.500 + .08 grains. The anvil is formed from rolled and tempered cartridge brass. The anvil has a height of 0.086 $-$ .0025 inch and a diameter of 0.1844 $-$ .0005 inch. The anvil is pushed into the pellet in the cup and the primers are placed in an oven at 120°F to dry the moisture from the pellet after which they are stored at 90-100°F prior to priming into the cartridge case.

PROPELLANT

The propellant used in match cartridges must meet a number of requirements. In addition to giving the bullet a particular velocity level with a safe pressure, it must give satisfactory performance at extremes of temperatures and produce a minimum of smoke, flash, fouling and barrel erosion. The propellant used in the M72 round gives the bullet a velocity of 2640 $\pm$ 30 feet per second at 78 feet from the muzzle when fired in a 24-inch test barrel and that used in the M118 round gives the bullet a velocity of 2550 $\pm$ 30 feet per second at the same range when fired in a 22-inch test barrel. The length of test barrel simulates that of the M1 and M14 rifles. Furthermore, a limit is imposed on the variation in velocity from shot to shot since long range accuracy is dependent on both the basic dispersion such as that obtained at short range and the velocity variation. The specification requires that the standard deviation of velocities shall not exceed 28 feet per second. The average chamber pressure limit is 50,000 pounds per square inch. To assure functioning in the M14 rifle, a further requirement of the propellant used in the M118 round is that the port pressure shall be 12,500 $\pm$ 2000 psi. The appropriate charge of propellant is established by means of velocity tests. Samples of loaded cartridges are taken from the production line twice daily and fired in a test rifle for velocity to maintain the desired velocity level. The ammunition is conditioned to a temperature of 70 $\pm$ 2° F before firing velocity tests.

CARTRIDGE ASSEMBLY

The primed case, propellant and bullet are assembled into a cartridge on a multiple-station press which can produce at a rate of 2000 cartridges per hour. The overall length of the M72 cartridge is 3.34 $-$ .04 inches and that of the M118 is 2.830 $-$ .030 inches. The cartridges are gaged and weighed on a seven-station automatic machine. This machine checks the profile and alignment, the head to shoulder length, the total length, the diameter of the extractor groove, the depth of the primer, the diameter of the head, the thickness of the head, and the cartridge weight. Cartridges which fail to meet the dimensions established are rejected. The cartridges are visually examined.

TESTING

During production of the match cartridges the bullets and cartridges are subjected to daily quality control accuracy tests. This firing is conducted on a 600-yard outdoor range. Firing is done with an accuracy test rifle consisting of an M1919A4-machine-gun-type barrel and an M1903 rifle action. The barrel is secured in a slide which operates in a V block attached to a Frankford Arsenal machine rest. The barrel length for the rifle firing the M72 round is 24 inches and that for the rifle firing the M118 round is 22 inches. The accuracy requirements for both cartridges is similar. The acceptance

test requirement is a mean radius of 3.5 inches for nine 10-shot groups from each of three test rifles at a range of 600 yards. The mean radius represents the average distance of each shot in the group from the group center.

The velocity is calculated at a distance of 78 feet from the muzzle by measuring the time required for the bullet to pass over a known distance. Photoelectric screens are used to detect the passage of the bullet and signals are fed into a chronograph to start and stop the counting mechanism. The photoelectric screens are positioned at distances of 28 and 128 feet from the rifle muzzle to give a base distance of 100 feet. The velocity is then calculated from the formula $v = 100/t$.

The maximum chamber pressure is calculated by means of copper crusher cylinders. The crusher cylinders have a length of 0.4010 – .0020 inch and a diameter of 0.2265 – .0020 inch. Sample cylinders are subjected to a static load and their change in length is determined. A tarage table is developed in this manner. The pressure gage consists of a test barrel with standard chamber and bore dimensions on which a hole is drilled through the chamber wall to accept a steel piston. A yoke permits a crusher cylinder to be positioned between the piston and a threaded anvil so that the cylinder is compressed on firing. The change in length of the cylinder is determined and this measurement is entered on the tarage table to obtain a corresponding pressure in pounds/square inch. Since the load applied to the cylinder in developing the tarage table was a static one and that applied when the round was fired was dynamic, this calculated result is not a true pressure reading. However, this system does provide an adequate measure of the safety of the cartridge.

Cartridge samples are further tested in the appropriate National Match rifle to assure proper functioning.

A bullet pull test is conducted to assure that the bullet will remain secure in the case during insertion and removal from the rifle. The requirement is a bullet-pull force of not less than 20 pounds.

BALLISTIC PERFORMANCE

In addition to accuracy performance, the shooter is interested in elevation and wind drift requirements. Tables show elevation and wind drift characteristics. The elevation and windage requirements vary somewhat from rifle to rifle because of variations in velocity level.

OBTAINING THE HIGHEST LEVEL OF PERFORMANCE FROM THE AMMUNITION

The following tips are given to assist the shooter in obtaining the highest level of performance from the ammunition:

1. Use the M118 match cartridge only in chambers designed for the 7.62mm NATO or .308 Winchester cartridge. Should the M118 cartridge be fired in the caliber .30 or .30/06 chamber, the shot will probably impact low on the target at short range or it will miss the target at long range. However, there will be no unusual hazard should such a mistake be made.

2. The velocity of the bullet increases with an increase in temperature. Therefore, try to maintain a uniform ammunition temperature during firing by avoiding for extended periods direct exposure of rounds to the sun and by maintaining a uniform firing rate so that a cartridge is not heated excessively while in the chamber.

3. When firing the M1 rifle, inspect the alignment of M72 cartridges in the clip to assure that they are properly assembled. A "long" round will cause a delay in reloading.

NATIONAL MATCH AMMUNITION BALLISTIC REQUIREMENTS

	Cal .30	7.62mm M118
Velocity -	2640 ± 30	2550 ± 30 feet/second
Pressure -	Not to exceed 50,000 lbs./square inch	
Accuracy -	3.50 inch Mean Radius Maximum Average	

MEASUREMENT OF ACCURACY

The object of shooting a rifle or pistol is to hit something. We can rate a weapon, then, based on your ability to make high scores with it, but this rating method is not satisfactory, as it includes personal ability, weather conditions and many other factors. In order to compare ammunitions or weapon-ammunition combinations they are fired under conditions eliminating as much as possible of the human and weather error, and the resulting groupings of shots on the target are measured and compared. But there are various methods of measuring the shot groups – each method having certain advantages. Some of these will be discussed.

Extreme spread (ES) is the easy choice, as it involves only a quick estimate by eye and one measurement. As it infers, you merely measure between the widest two shots of the group, regardless of whether the measurement is vertical, horizontal or in-between. It is a useful sort of measure for the target shooter, who is interested in getting all of his shots in a certain small-sized bull's-eye.

Maximum spread does not give you any information on the shape of the group, that is whether it is strung up and down, wide laterally or symmetrical in shape.

A couple more measurements will readily give you this information. By getting the vertical distance between the top and the bottom shots of the group you will have the extreme vertical (EV). The horizontal distance between the left and the right shots of the group will give you the extreme horizontal (EH). Extreme vertical and extreme horizontal are frequently less than the extreme spread, may be equal to it, but cannot be larger than the extreme spread. See Figure A.

A puffy, lateral wind tends to spread a group sidewise and this effect may overshadow the normal lateral dispersion. You may want to forget about extreme horizontal spread for this reason, or you may want to compare different cartridges shot under the same sort of conditions for both accuracy and sensitivity to wind by using figure of merit as your yardstick.

Figure of merit (F/M) as used in this country, is the sum of the extreme vertical plus the extreme horizontal, divided by two. While figure of merit isn't used too often, you sometimes run into it, particularly in connection with the .22 rifle.

Before going further, we should discuss the point from which you measure, that is, whether from the inside, center or outside edge of the bullet holes. It is customary to measure from center to center of bullet holes, rather than from inside or outside edge. If there is any double, the point of measurement should be specified.

As you can readily see, extreme measurements give a great deal of importance to a single shot. To rescue this distorted value given to a single shot, in military ammunition it is customary to use the mean radius (MR) as the accuracy measure. Mean radius is more trouble to get, but it provides information not given by the simpler extreme measurements.

A rough-and-ready way of getting the center of impact is to draw a vertical line with the same number of shots on each side of the line and approximately dividing the distance between the two innermost shots. Draw a horizontal line in the same fashion. The point where these two lines cross is pretty close to the C/I – close enough for sight changes, although not good enough for the next step in getting the mean radius.

From the accurate center of impact you measure the distance to each of the shot holes, as shown in Figure B. Add these figures, divide by 10 and there it is – the mean radius!

An approximation of the mean radius can be obtained by adding the extreme vertical and the extreme horizontal measurements and dividing by five, or if you want to get some idea of extreme spread, multiply the mean radius by three. Don't trust these approximate methods too far as they can be way off on occasions.

Since mean radius is the result of an averaging process, it's possible for extreme spread to vary considerably in different groups that have the same mean radius. While this is an extreme case, it is something to consider when you're thinking about mean radius.

Closely related to mean radius are mean vertical deviation and mean horizontal deviation. To get mean vertical deviation, measure vertically from the horizontal line through the center of impact to each shot, total these measurements and divide by 10. Mean horizontal deviation is similarly measured, but horizontally from the vertical line through the center of impact. Since these also are averaging measurements, they are subject to the same difficulties as mean radius, but do tell you whether the error is mainly vertical or horizontal. As with the measurements of extremes, mean vertical and mean horizontal deviations can't be greater than the mean radius.

While there are many other methods of measuring or expressing accuracy – probable error, standard deviations, variance, etc. – the methods outlined here are most satisfactory in small arms, target shooting field.

The accuracy with which the distances should be measured depend on the group size, equipment available, and the accuracy required. To get measurements accurate to about 1%, means that small group (around 1-2 inches) should be measured to the nearest hundreth inch (.01), moderate sized group (around 10 inches to the nearest tenth inch (.1) and larger groups to the nearest half inch or inch. An average should be given in the same figures as the individual measurements.

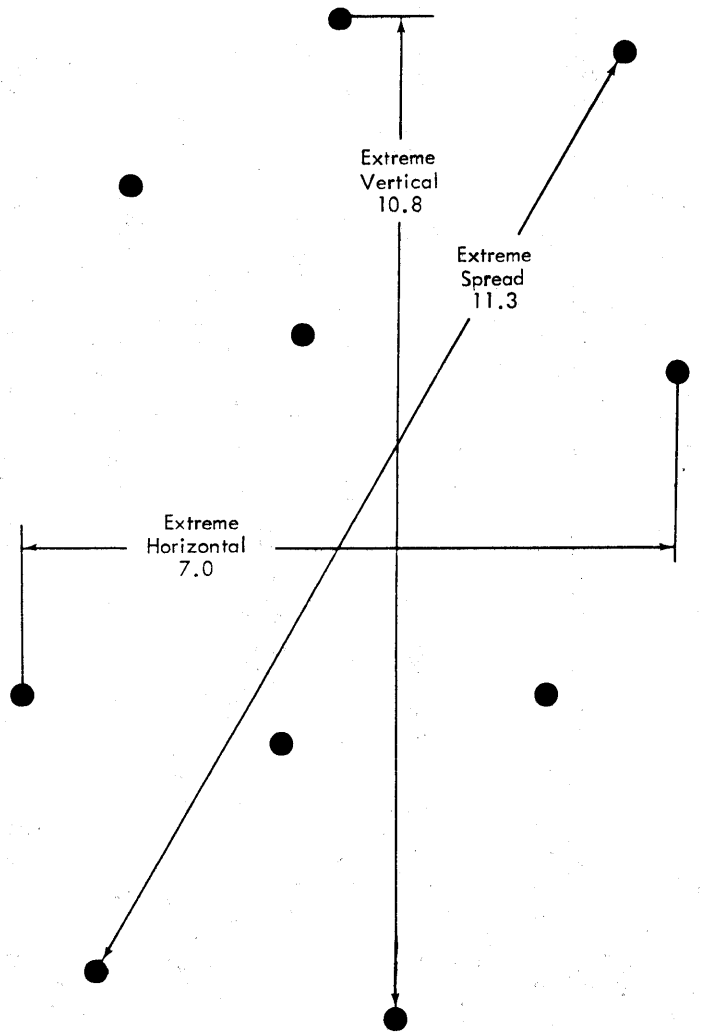
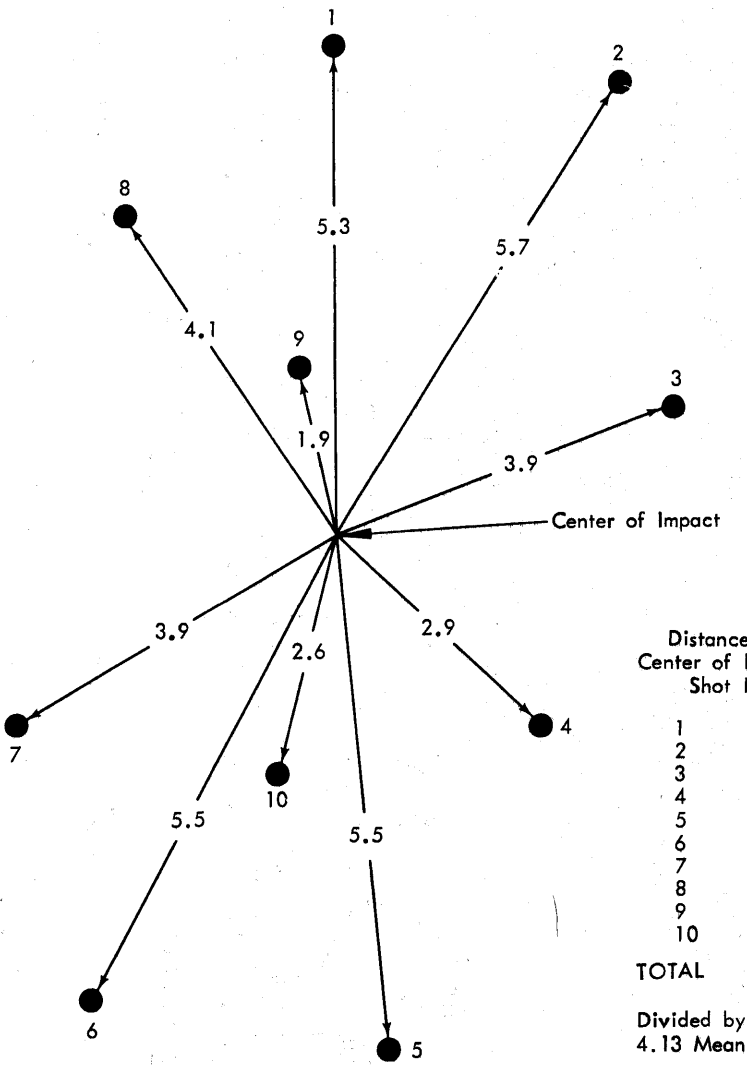


FIGURE A

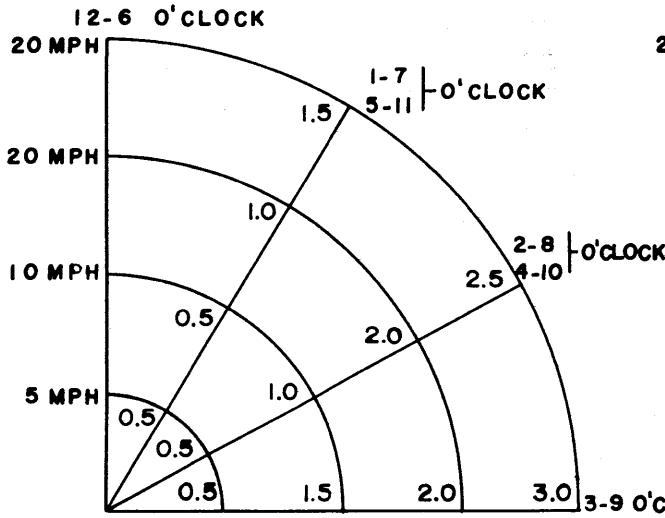


Distance from Center of Impact to Shot No.	
1	5.3
2	5.7
3	3.9
4	2.9
5	5.5
6	5.5
7	3.9
8	4.1
9	1.9
10	2.6
TOTAL	41.3

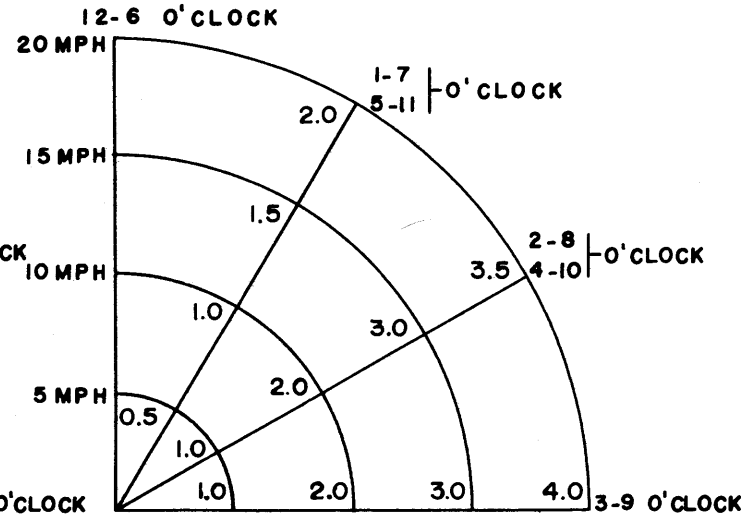
Divided by 10 = 4.13 Mean Radius

FIGURE B

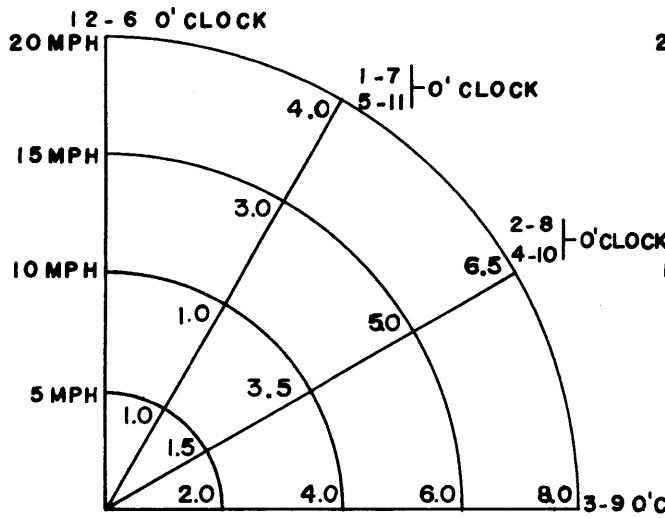
WINDAGE AND ELEVATION IN ANGULAR MINUTES FOR 7.62MM, M118, NATIONAL MATCH AMMUNITION



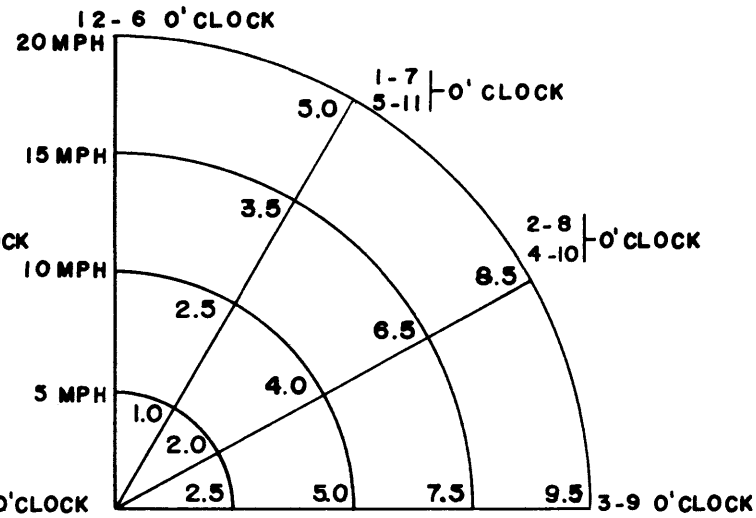
RANGE: 200 YDS.-ELEV.: 5.5 MIN.



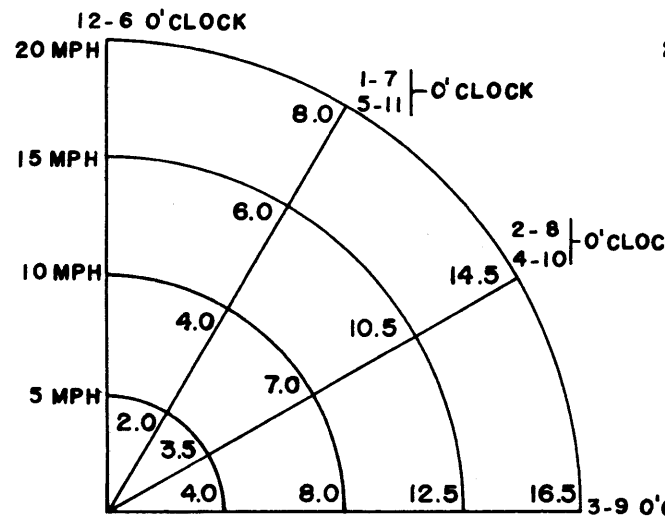
RANGE: 300 YDS.-ELEV.: 8.5 MIN.



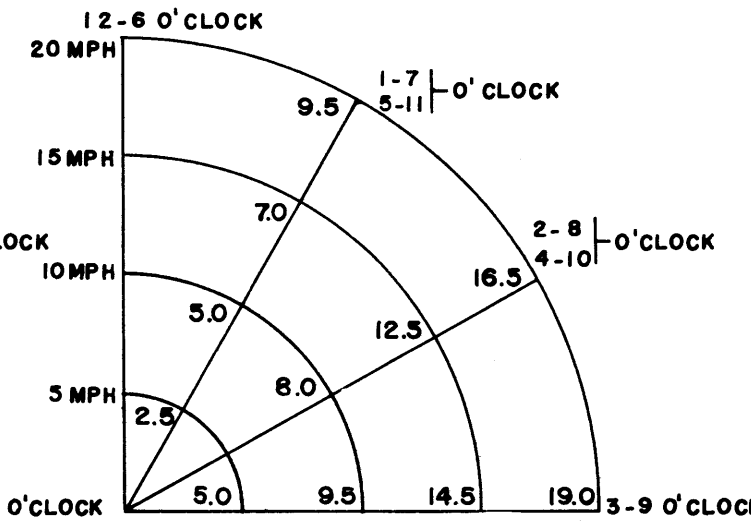
RANGE: 500 YDS.-ELEV.: 15.5 MIN.



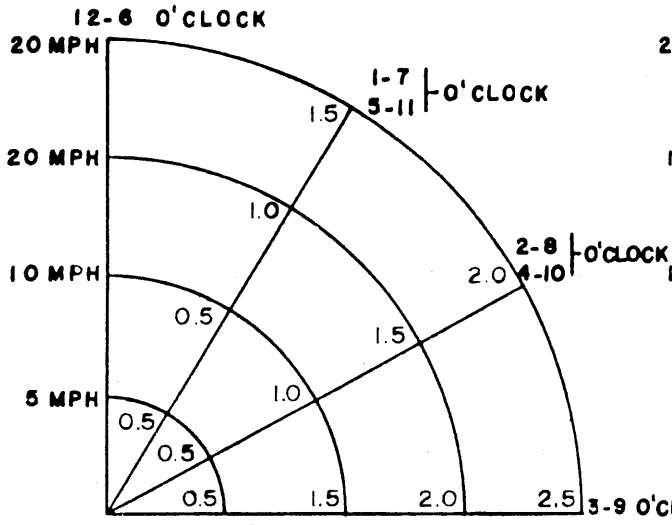
RANGE: 600 YDS.-ELEV.: 20.0 MIN.



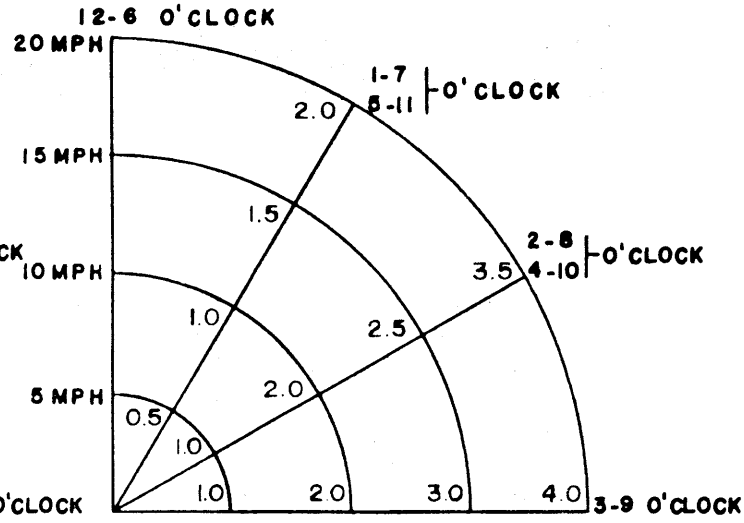
RANGE: 900 YDS.-ELEV.: 36.0 MIN.



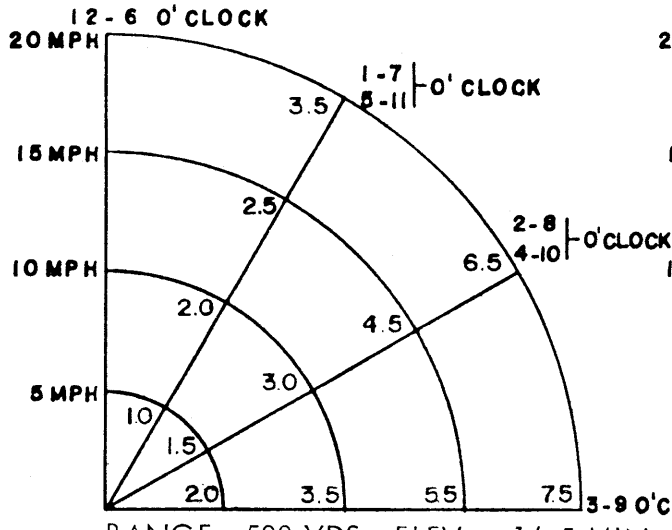
RANGE: 1000 YDS.-ELEV.: 43.0 MIN.



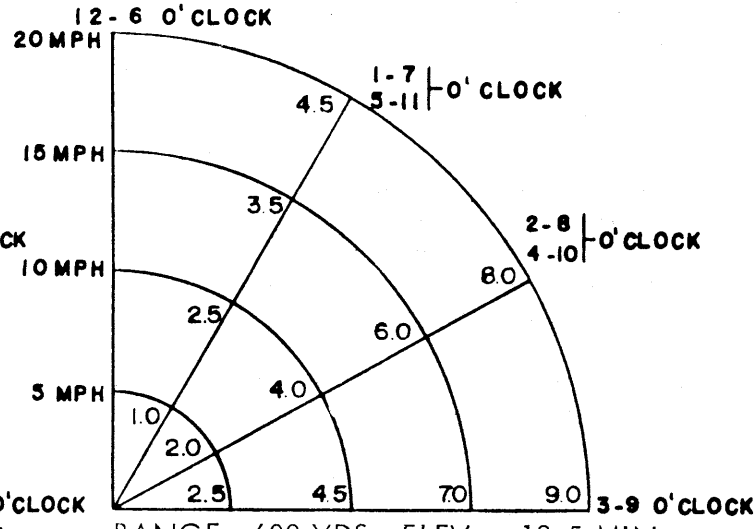
RANGE: 200 YDS.-ELEV.: 5.0 MIN.



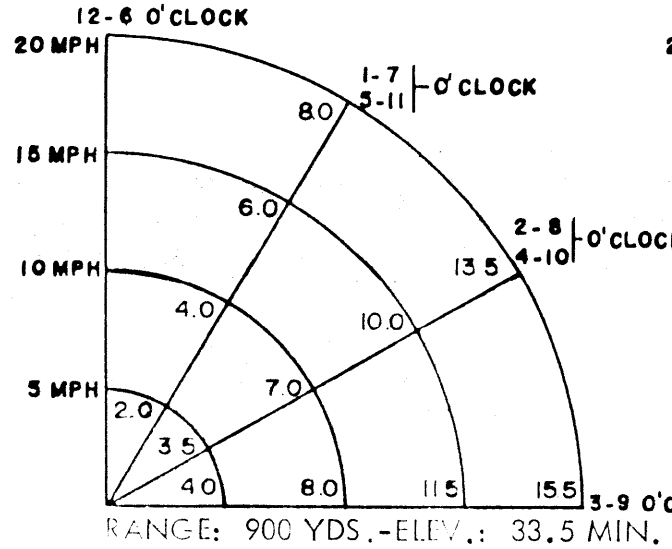
RANGE: 300 YDS.-ELEV.: 8.0 MIN.



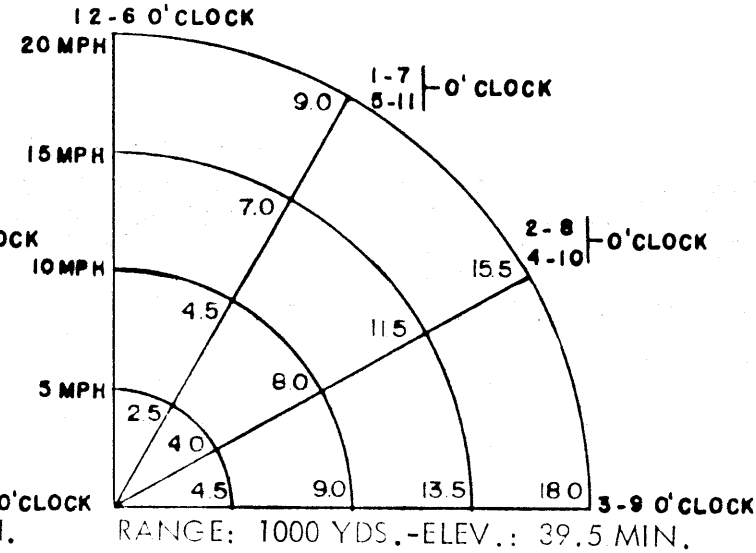
RANGE: 500 YDS.-ELEV.: 14.5 MIN.



RANGE: 600 YDS.-ELEV.: 18.5 MIN.



RANGE: 900 YDS.-ELEV.: 33.5 MIN.



RANGE: 1000 YDS.-ELEV.: 39.5 MIN.

HISTORY

In March, 1953, Springfield Armory was directed by Office, Chief of Ordnance to furnish 800 U. S. Cal. .30 M1, Rifles for use at the National Matches. These rifles were to be selected as being of excellent quality and workmanship and should possess accuracy (size of groups), and targeting (location of group), capabilities superior to the average service weapon. The Armory, at that time, was manufacturing new M1 rifles, a situation which naturally lessened the work required to produce the desired lot of match quality guns. Because of the high standards to which the service rifles were being produced it was necessary to apply only minor gunsmithing to any weapon to obtain National Match quality.

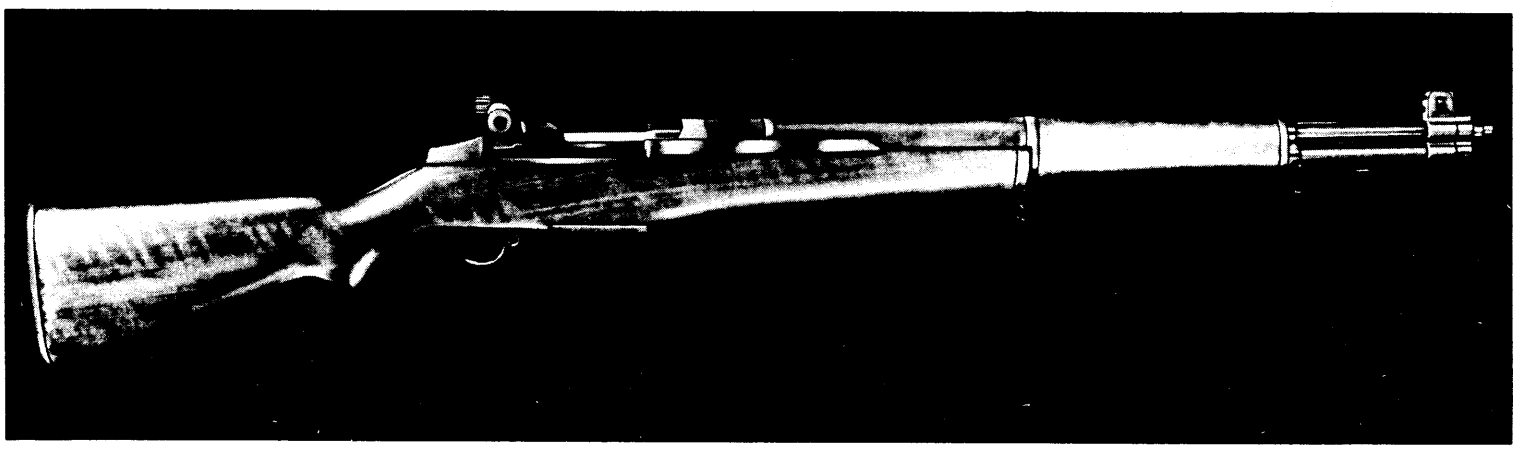
During the succeeding years from 1954 through 1963 the Armory produced National Match quality weapons by two methods, namely; (1) by applying minor gunsmithing operations to newly manufactured rifles as described in the preceding paragraph and (2) by rebuilding National Match weapons returned to the installation from various locations throughout the world. The latter procedure requires a considerable amount of inspection, refinishing, and rebuilding of weapon components. This work is necessary to eliminate parts which evidence excessive wear or which have been altered in the field for some particular reason. Each rebuilt National Match rifle is rebarrelled, restocked and glass bedded.

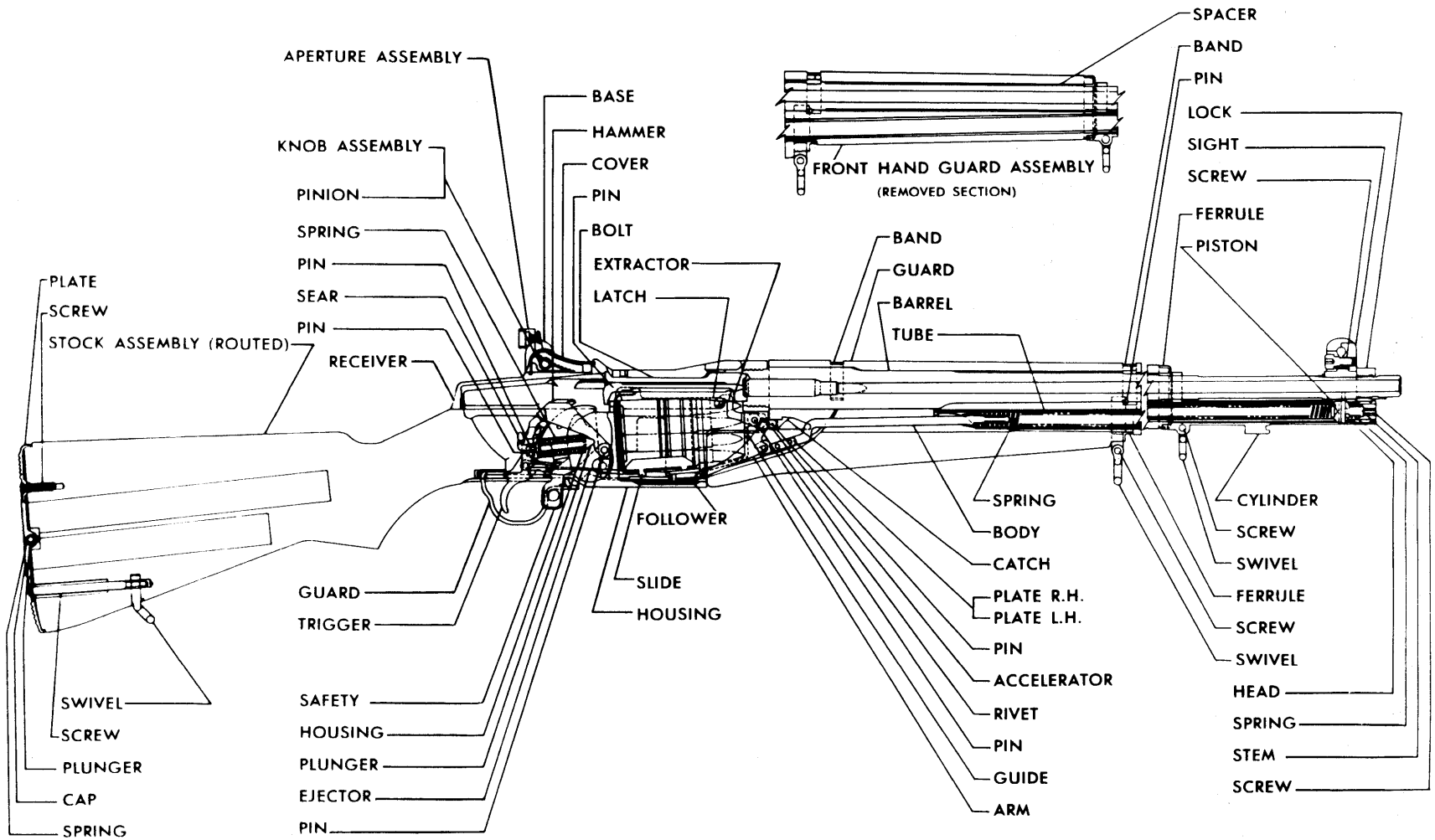
Inasmuch as production of new Cal. .30 M1 Rifles has been completely curtailed, M1, NM Rifles that were issued during the 1963 National Matches were rebuilt weapons. However, because of the critical acceptance standards applicable to National Match rifles, and because of the expert workmanship employed to meet these standards it is not likely the user is able to distinguish between new and rebuilt weapons either in appearance or performance.

The following year by year breakdown indicates the quantity of National Match Cal. .30 M1 rifles produced by Springfield Armory:

Year	New	Rebuilt	Total
1953	800		800
1954	4184	499	4683
1955	3003	314	3317
1956	5050	550	5600
1957	4184	499	4683
1958	1295	731	2026
1959	2877	2652	5529
1960		8663	8663
1961		1410	1410
1962		4500	4500
1963		3639	3639

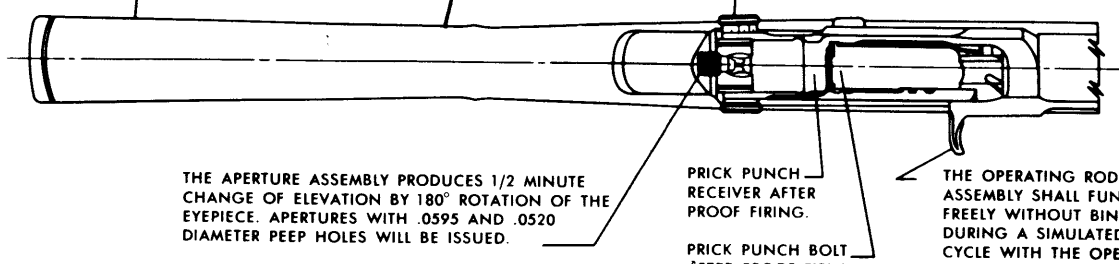
NATIONAL MATCH RIFLE, U. S., CAL. .30, M1





RIFLE, U. S. CALIBER .30, M1, NATIONAL MATCH
(SECTIONAL VIEW)

ESSENTIAL POINTS AND AREAS OF NATIONAL MATCH M1 RIFLE



ALL WOODEN COMPONENTS SHALL BE SOLID HEARTWOOD WITH THE DIRECTION OF THE GRAIN PARALLEL TO THE LONGITUDINAL AXIS OF STOCK.

STOCK SHALL HAVE NO OPEN GRAIN WHICH MIGHT SWELL EXCESSIVELY IN HIGH HUMIDITY.

PROTECTIVE FINISH TUNG (CHINAWOOD) OIL.

REAR SIGHT MARKINGS MUST BE DISTINCT.

KNOBS MUST HAVE FREE MOVEMENT, INDEPENDENT OF EACH OTHER, DEFINITE CLICKING ACTION, AND POSITIVE RETENTION.

ELEVATING KNOB MUST BE ON 100 YD SETTING WHEN APERTURE IS ELEVATED 8 CLICKS FROM LOWEST POSITION.

SIGHT MUST BE FREE OF EXCESS OIL.

SCREW, REAR SIGHT SHALL BE TIGHTENED WITHIN 20 TO 25 INCH LBS.

THE APERTURE ASSEMBLY PRODUCES 1/2 MINUTE CHANGE OF ELEVATION BY 180° ROTATION OF THE EYEPIECE. APERTURES WITH .0595 AND .0520 DIAMETER PEEP HOLES WILL BE ISSUED.

PRICK PUNCH RECEIVER AFTER PROOF FIRING.

PRICK PUNCH BOLT AFTER PROOF FIRING.

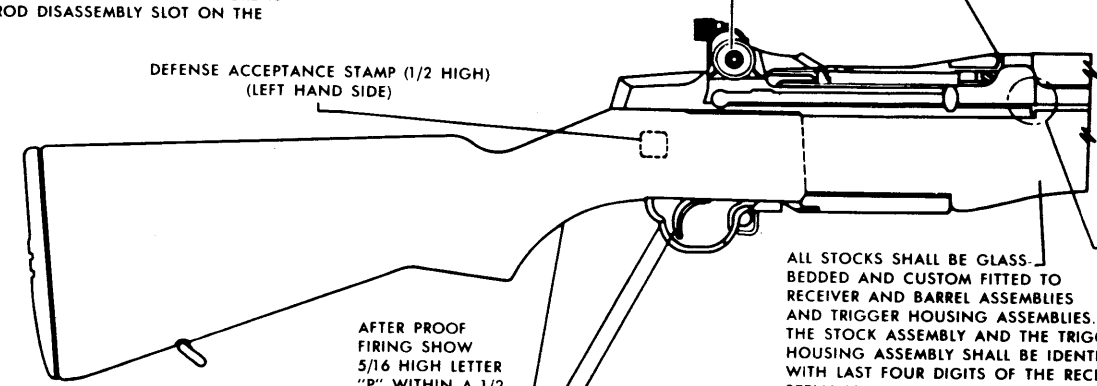
THE OPERATING ROD ASSEMBLY SHALL FUNCTION FREELY WITHOUT BINDING DURING A SIMULATED FIRING CYCLE WITH THE OPERATING ROD SPRING REMOVED.

HEADSPACE SHALL BE 1.940 TO 1.943. LIGHT FINGER PRESSURE SHALL BE USED IN CHECKING HEADSPACE.

AREA "A"
WITH THE OPERATING ROD SPRING AND ROD FOLLOWER DISASSEMBLED FROM THE RIFLE AND BY LIFTING THE ASSEMBLED RIFLE TO AN APPROXIMATE 60° ANGLE WITH THE MUZZLE UP, THE BOLT SHALL OPEN FULLY WITHOUT ANY MANUAL ASSISTANCE. NEXT, POINT THE MUZZLE DOWN ON AN ANGLE OF APPROXIMATELY 60°. THE BOLT SHALL CLOSE FULLY WITHOUT ANY MANUAL ASSISTANCE. WITH THE TRIGGER HOUSING AND STOCK DISASSEMBLED FROM THE RIFLE AND THE OPERATING ROD FULLY RETRACTED, APPLY A LIGHT PRESSURE TO THE HANDLE OF THE ROD INWARDS AT AREA "A." TENSION IN THE ROD MUST TEND TO RELOCATE THE ROD IN ITS ORIGINAL POSITION. THE VISIBLE OPENING BETWEEN THE RECEIVER AND THE HANDLE OF THE ROD IN THIS HORIZONTAL PLANE SHOULD NOT EXCEED .030 AND SHOULD GRADUALLY DECREASE BETWEEN THE POINT WHERE PRESSURE IS APPLIED AND THE ROD DISASSEMBLY SLOT ON THE RECEIVER. NEXT, APPLY PRESSURE DOWNWARDS ON THE ROD TOWARD THE RECEIVER RAIL IN THE SAME LOCATION AS ABOVE. THE TENSION IN THE ROD MUST RELOCATE THE ROD IN ITS ORIGINAL POSITION. THE VISIBLE OPENING BETWEEN THE ROD AND THE RAIL IN THIS VERTICAL PLANE SHALL NOT EXCEED .015 AND SHOULD GRADUALLY DECREASE BETWEEN THIS POINT WHERE PRESSURE IS APPLIED AND THE ROD DISASSEMBLY SLOT ON THE RECEIVER.

THREADS ON WINDAGE KNOB SHALL MEASURE 5/16-64NS-3A. THREADS ON BASE REAR SIGHT SHALL MEASURE 5/16-64NS-3B. IDENTIFICATION MARK SHALL CONSIST OF THE LETTERS "NM" 1/16 HIGH INSCRIBED ON THE RIGHT SIDE OF EACH PART.

AFTER PROOF FIRING, THE HEADSPACE WITH COMPONENT BOLT SHALL BE FROM 1.940 MIN. TO 1.943 MAX.



DEFENSE ACCEPTANCE STAMP (1/2 HIGH) (LEFT HAND SIDE)

AREA "A"

ALL STOCKS SHALL BE GLASS-BEDDED AND CUSTOM FITTED TO RECEIVER AND BARREL ASSEMBLIES AND TRIGGER HOUSING ASSEMBLIES. THE STOCK ASSEMBLY AND THE TRIGGER HOUSING ASSEMBLY SHALL BE IDENTIFIED WITH LAST FOUR DIGITS OF THE RECEIVER SERIAL NUMBER. THESE ASSEMBLIES SHALL NOT BE INTERCHANGED AFTER GLASS BEDDING PROCESS HAS BEEN COMPLETED.

AFTER PROOF FIRING SHOW 5/16 HIGH LETTER "P" WITHIN A 1/2 DIAMETER CIRCLE.

CLAMPING OF THE TRIGGER GUARD SHALL HAVE A DEFINITE RESISTANCE AT A MIN. DISTANCE OF 3/8 OF AN INCH FROM THE FULL LOCK POSITION.

THE TRIGGER PULL REQUIRED TO RELEASE THE HAMMER SHALL BE SMOOTH, FREE FROM "CREEP," AND WITHIN THE LIMITS OF FOUR AND ONE-HALF TO SIX LBS.

FUNCTIONAL SURFACES OF THE HOOKS OF THE HAMMER AND TRIGGER, AND THE RELATED MATING SURFACES OF THE SEAR MAY HAVE THE PHOSPHATE COATING REMOVED BY POLISHING TO ASSURE SMOOTH TRIGGER PULL.

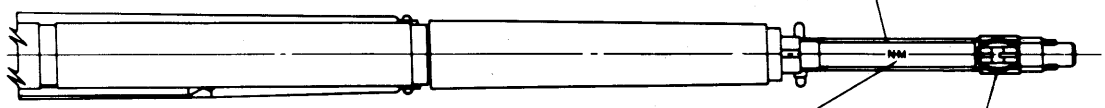
THE STOCK SHALL BE FREE FROM CONTACT WITH THE BARREL.

THE STOCK SHALL HAVE A .005 MINIMUM CLEARANCE IN THE AREA BETWEEN REAR OF RECEIVER BEDDING SURFACE AND RECEIVER RAIL BEDDING SURFACES.

THE STOCK SHALL BE FREE OF ANY CONTACT WITH REAR HAND GUARD.

THE BARREL SHALL BE LINE STRAIGHTENED TO MEET THE REQUIREMENTS OF OPTICAL STRAIGHTNESS GAGE.

THE BARREL MUZZLE SHALL BE CROWNED - CONCENTRIC WITH BORE (60° INCLUDED ANGLE) TO REMOVE BURRS. STRAIGHTNESS OF THE BARREL SHALL BE SUCH THAT THE BORE CENTERLINE ESTABLISHED BY A SELF-ALIGNING EXPANSION PLUG (2½ INCHES LONG WITH A PILOT DIAMETER OF .2993-.0001) THAT FITS AND ALIGNS ITSELF IN THE BORE AT THE MUZZLE END, THE MAXIMUM ALLOWABLE DEVIATION FROM THAT CENTERLINE SHALL NOT EXCEED 0°2'23" THROUGHOUT THE LENGTH OF THE BORE. ANY RESULTANT TAPER OF THE BORE SHALL BE WITHIN DIMENSIONAL LIMITS AND BE DIMINISHING FROM BREECH TO MUZZLE.



IDENTIFICATION MARK SHALL CONSIST OF THE LETTERS "NM" APPROXIMATELY 1/8 INCH INSCRIBED ON THE BARREL APPROXIMATELY MIDWAY BETWEEN THE FRONT HAND GUARD AND FRONT SIGHT.

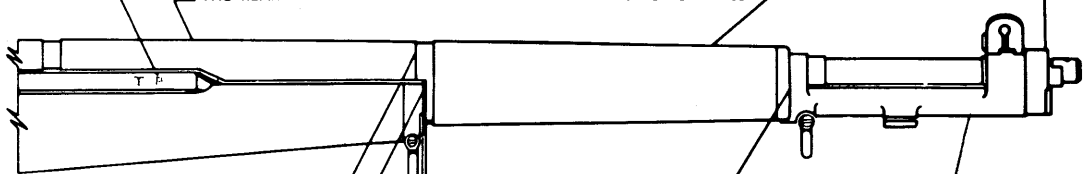
TOP OF FRONT SIGHT BLADE SHALL BE SQUARE WITH SIDE AND ALL EDGES AND CORNERS SHALL BE SHARP TO .005 R. MAX. FRONT SIGHT SHALL NOT OVERHANG THE SIDES OF THE GAS CYLINDER.

IN ASSEMBLY, THE GAS CYLINDER LOCK SHALL BE HAND TIGHTENED AGAINST THE SHOULDER ON THE BARREL WITHIN A RANGE OF SLIGHTLY BEYOND THE 6 O'CLOCK POSITION BUT NOT IN EXCESS OF 60° (8 O'CLOCK) PAST THE 6 O'CLOCK POSITION. THE GAS CYLINDER LOCK SHALL THEN BE "BACKED OFF" THE MINIMUM DISTANCE NECESSARY TO ALIGN WITH THE GAS CYLINDER AT THE 6 O'CLOCK POSITION.

THE FRONT HAND GUARD SHALL HAVE NO LONGITUDINAL MOVEMENT.

AFTER PROOF FIRING, PRICK PUNCH BARREL WITHIN LOOP OF LETTER "P" EXPOSED WHEN OPERATING ROD IS IN REARMOST POSITION.

THE REAR HAND GUARD MAY BE FREE TO MOVE LONGITUDINALLY.



STOCK FERRULE SHALL NOT CONTACT LOWER PORTION OF LOWER BAND. THERE SHALL BE APPROXIMATELY 1/64 MIN. CLEARANCE.

.005 MIN. CLEARANCE BETWEEN HANDGUARD AND GAS CYLINDER.

LOWER BAND SHALL BE PERMANENTLY ATTACHED TO THE FRONT HAND GUARD ASSEMBLY.

THERE SHALL BE NO BINDING OF OPERATING ROD IN LOWER HOLE OF LOWER BAND ASSEMBLY.

GAS CYLINDER SHALL FIT TIGHTLY ON THE BARREL BEARING DIAMETER AND THE SPLINES. THERE SHALL BE NO ROTATIONAL MOVEMENT.

GAS CYLINDER SHALL BE BROUGHT FORWARD AGAINST THE LOCK BEFORE TIGHTENING THE GAS CYLINDER LOCK SCREW.

GAS CYLINDER SPLINED HOLE AND REAR RING SHALL MEET REQUIREMENTS OF ALIGNMENT GAGE.

GENERAL REQUIREMENTS

All components shall be of latest design.

All wooden components shall be of solid walnut heartwood with the direction of grain parallel to the longitudinal axis of the stock.

All stocks shall be glass bedded and custom fitted to receiver and barrel assemblies and trigger housing assemblies. The stock assembly and the trigger housing assembly shall be identified with last four digits of the receiver serial number. These assemblies shall not be interchanged after glass bedding process has been completed.

The stock shall be free from contact with the barrel or handguard.

Stock ferrule shall not contact lower portion of lower band longitudinally; there shall be approximately 1/64 inch minimum clearance.

The stock shall have a clearance in the area between rear of receiver bedding surface and receiver rail bedding surfaces.

Clamping of the trigger guard shall have a definite resistance at a minimum distance of ⅜ inch from the full lock position.

Gas cylinder shall fit tightly on the barrel bearing diameter and the splines. There shall be no rotational movement.

Gas cylinder shall be brought forward against the lock before tightening the gas cylinder lock screw.

In assembly, the gas cylinder lock shall be hand tightened against shoulder on the barrel within a range of slightly beyond the 6 o'clock position but not in excess of 60° (8 o'clock) past the 6 o'clock position. The gas cylinder lock shall then be "backed off" the minimum distance necessary to align with the gas cylinder at the 6 o'clock position.

Gas cylinder splined hole and rear ring shall meet requirements of alignment gage.

The barrel muzzle shall be crowned – concentric with bore (60° included angle) to remove burrs.

The barrel shall be straightened to meet the requirements of the optical straightness gage. Straightness of the barrel shall be such that the bore centerline established by a self-aligning expansion plug (2½ inches long with a pilot diameter of .2993 minus .0001) that fits and aligns itself in the bore at the muzzle end, the maximum allowable deviation from that centerline shall not exceed 0° 2' 23" throughout the length of the bore. Any resultant taper of the bore shall be within dimensional limits and be diminishing from breech to muzzle.

The operating rod assembly shall function freely without binding during a simulated firing cycle with the operating rod spring removed.

The trigger pull required to release the hammer shall be smooth, free from "creep," and within the limits of four and one-half to six pounds. Functional surfaces of the hooks of the hammer and trigger, and the related mating surfaces of the sear may have the phosphate coating removed by polishing to assure smooth trigger pull.

Aperture assemblies 1005-864-2926 & 1005-864-2928 produce ½ minute change of elevation by 180° rotation of the aperture. Aperture assembly (standard) shall have an eyepiece with an .0595 peep hole. Aperture assembly (alternate) shall have an eyepiece with an .0520 peep hole.

Threads on windage knob shall measure 5/16-64 NS-3A. Threads on rear sight base shall measure 5/16-64 NS-3B.

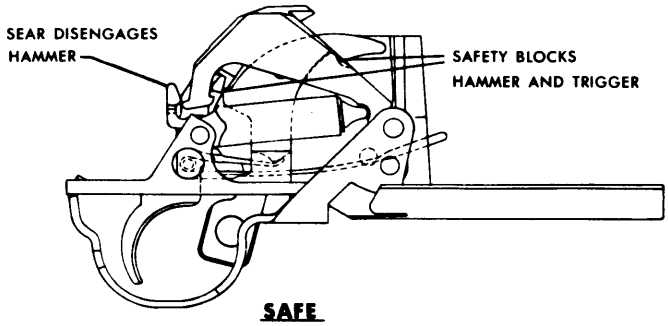
Top of front sight blade shall be square with side and all edges and corners shall be sharp to .005 R. Max. Front sight shall be sharp and square and shall not overhang the sides of the gas cylinder.

Headspace shall be 1.940 to 1.943. Light finger pressure shall be used in checking headspace.

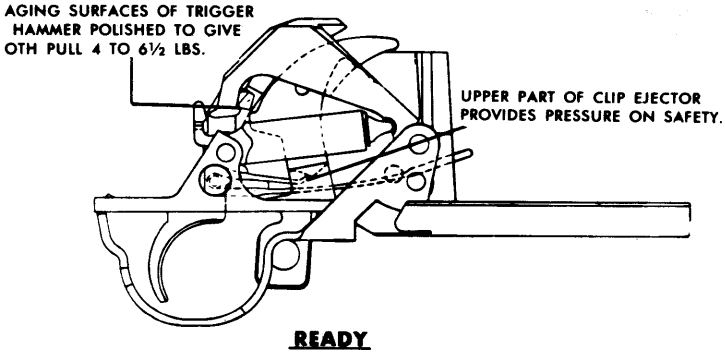
Identification mark shall consist of the letters "NM" approximately ⅛ inch high inscribed on the barrel approximately midway between the front hand guard and front sight.

ESSENTIAL POINTS AND AREAS

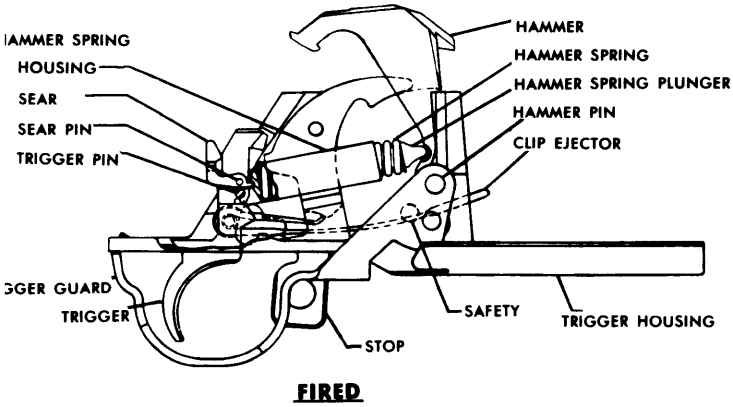
The essential points and areas established by these general requirements are illustrated on pages 28 and 29.



SAFE



READY



FIRED

FIRING MECHANISM

FIRING MECHANISM

The firing mechanism of the National Match M1 rifle is composed of standard parts specially fitted to meet National Match requirements.

The major components of this group are the trigger housing, trigger guard, trigger assembly, safety, hammer, and hammer spring. This group effectively controls the firing of the rifle. To prevent accidental firing, the hammer can be locked in cocked position by the safety. In the event of a misfire, the trigger guard may be used to cock the mechanism.

The rearward movement of the operating rod causes the bolt to move to the rear. The bolt cams the hammer down and rearward and compresses the hammer spring. If at this time the trigger has not been released, the sear engages the rear hammer hooks. Subsequent release of the trigger disengages the sear and allows the hammer to slide into engagement with the trigger lugs. Because of this, a separate squeeze on the trigger is necessary to fire each round.

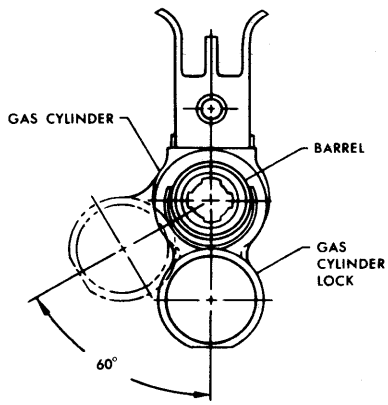
When the safety is in the rearward (SAFE) position it blocks both the hammer and the trigger.

When the safety is in the forward (READY) position the hammer pivots forward to be engaged, at its front hooks, by the trigger. The hammer and trigger are free to move. Squeezing the trigger disengages the front hooks, and the hammer is driven forward under spring pressure to strike the firing pin and discharge the rifle.

The forward clamping shelf of the trigger housing covers the bottom of the receiver and prevents foreign matter from entering the weapon. The center upright section provides the hole for the hammer pin which serves as a pivot for the hammer and trigger guard. This section also serves as a vertical stop surface for the base of the cartridge clip. The clip ejector positioned at the lower left side of the housing extends through the upright section and exerts continual upward pressure on the clip. Another function of the clip ejector is to spring-load the safety in the selected position. A hole through the upper left side of the housing accommodates the boss of the safety. The trigger pin which passes through the rear section serves as a pivot for the trigger assembly and holds the rear end of the hammer spring housing. The trigger guard is locked in the closed position at the lower rear edge of the housing.

GAS CYLINDER

The gas cylinder is a special part and is identified by the letters "NM" on the flat at the rear of the stacking swivel. This gas cylinder is inspected to assure that it fits tightly at the barrel bearing diameter, and that there is no rotational movement of the gas cylinder on the barrel.



FIT OF GAS CYLINDER AND LOCK

The gas cylinder lock should tighten against the shoulder on the barrel within a range of slightly beyond the 6 o'clock position but not in excess of 60° (8 o'clock) beyond the 6 o'clock position. The gas cylinder lock is then "backed off" the minimum distance necessary to align the gas cylinder at the 6 o'clock position.

It is imperative that the gas cylinder lock screw be kept properly tightened.

HAND GUARDS

The front hand guard is permanently attached to the lower band. The lower band is pinned to the barrel which eliminates movement of the front hand guard assembly. The stock ferrule at the forward end of the front hand guard must not touch the rear of the gas cylinder.

The rear hand guard may be free to move longitudinally.

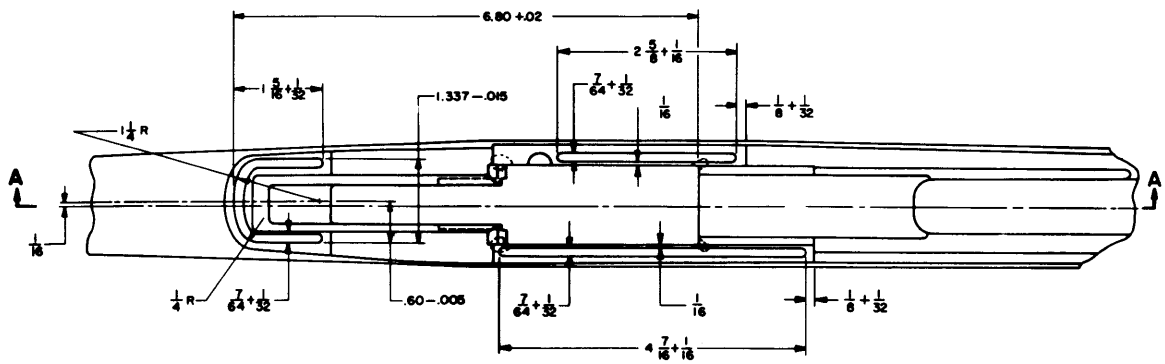
GLASS BEDDING

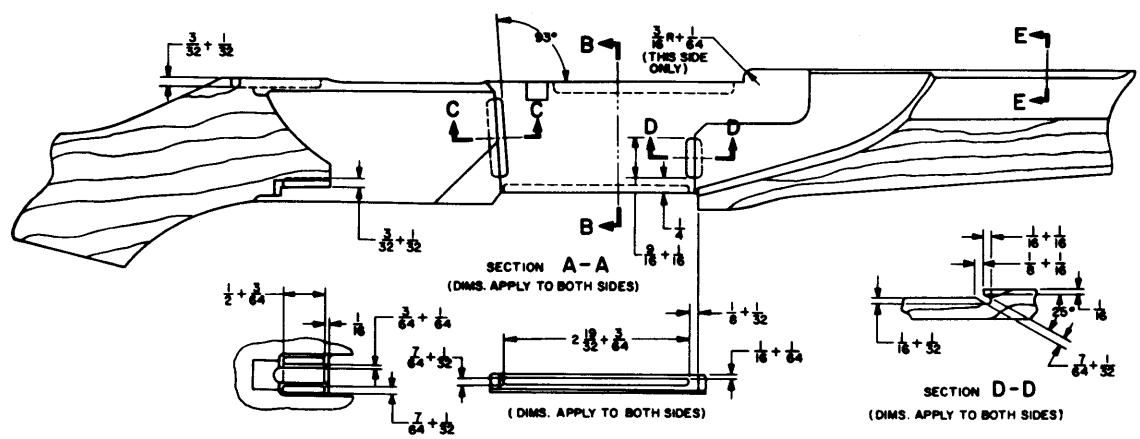
It has been established that glass bedding improves both accuracy and maintaining of rifle zero.

Pages 34 thru 36 illustrate the method used for glass bedding M1 National Match rifles at Rock Island Arsenal. Preparatory-routing of the stock is illustrated on page 33. Standard stocks may be glass bedded if similarly routed.

Materials required for glass bedding are commercially available employing an epoxy resin, milled fiberglass, polyamide resin and catalysts. Prior to using the above materials, it is imperative that a suitable release compound be applied to completely coat those parts of the metal components which will be in contact with the glass bedding. The mold release compound facilitates the breaking away of metal parts, thus leaving an exact molded impression of the metal components. In addition, a suitable solvent should be used for cleaning excess flash in the soft state prior to hardening and for sundry cleaning of equipment. It has been found that the most suitable method for applying glass compound is by the use of a syringe type polyethelene applicator having an orifice of approximately 7/64 or 1/8 inch diameter, effecting a smooth constant extrusion of material into the routed stock channels.

Whenever commercial products are used it is recommended that suppliers' instructions be followed.





ROUTED STOCK
M1 NM

INSTRUCTIONS FOR GLASS BEDDING RIFLE U. S. CAL. .30 M1 NATIONAL MATCH

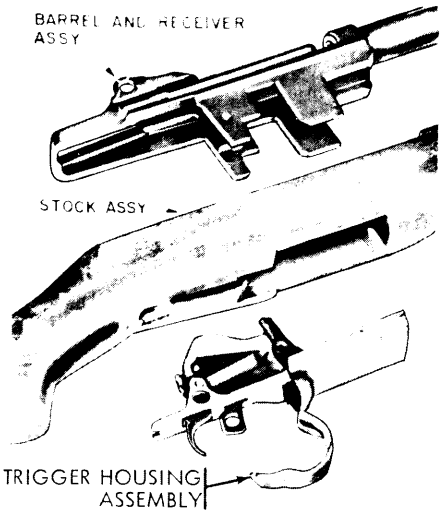


FIGURE 1

THREE MAJOR ASSEMBLIES USED IN THE GLASS BEDDING PROCESS.
IMPORTANT: THE STOCK ASSEMBLY AND TRIGGER HOUSING ASSEMBLY SHALL BE IDENTIFIED WITH THE LAST FOUR DIGITS OF THE RECEIVER SERIAL NUMBER. NOTE: IT IS IMPORTANT THAT THESE COMPONENTS BE KEPT TOGETHER THROUGHOUT THE GLASS BEDDING PROCESS.

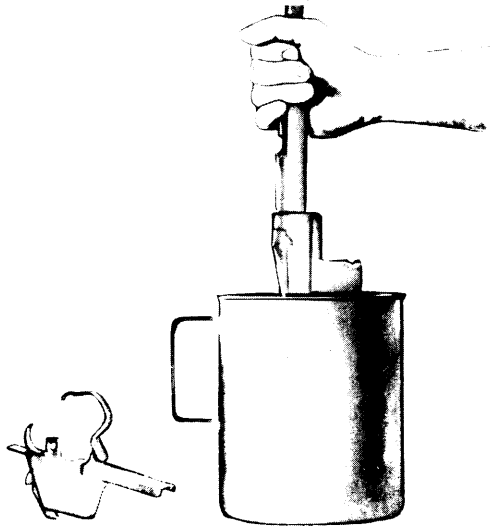


FIGURE 3

DIP AND COMPLETELY SUBMERGE BOTH THE RECEIVER AND TRIGGER HOUSING ASSEMBLY INTO THE RELEASE COMPOUND AND ALLOW TO AIR DRY.
IMPORTANT: DIP COATING INTO THE RELEASE COMPOUND IS NECESSITATED BECAUSE OF THE OUTSTANDING ADHESIVE PROPERTIES OF THE EPOXY GLASS FORMULATION.

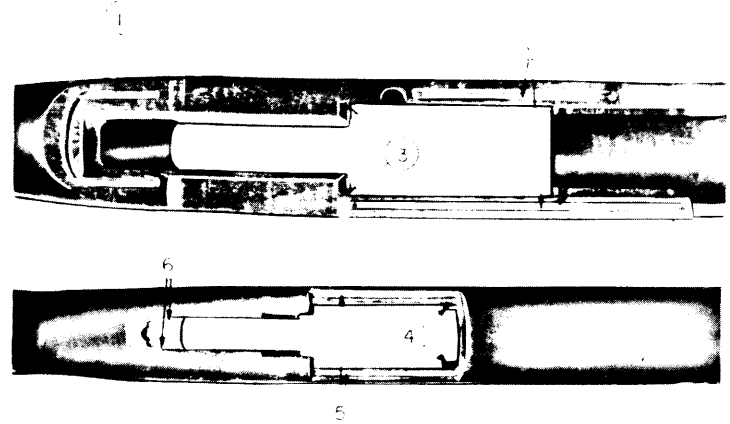


FIGURE 2

TOP AND BOTTOM VIEWS OF STOCK SHOWING ROUTED AREAS (1 THROUGH 6) OF BEDDING SURFACES OF RECEIVER AND TRIGGER HOUSING ASSEMBLY.

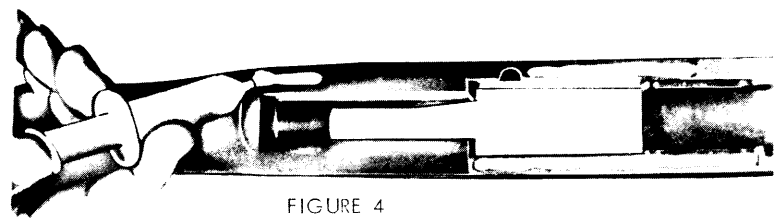


FIGURE 4

FILL ROUTED AREAS 1, 2 AND 3 WITH GLASS BEDDING COMPOUND. AN EXCESS QUANTITY OF GLASS COMPOUND IS REQUIRED IN FILLING THE ROUTED CHANNELS TO INSURE THAT THE INLETTED BEDDING SURFACES ARE COMPLETELY COVERED.

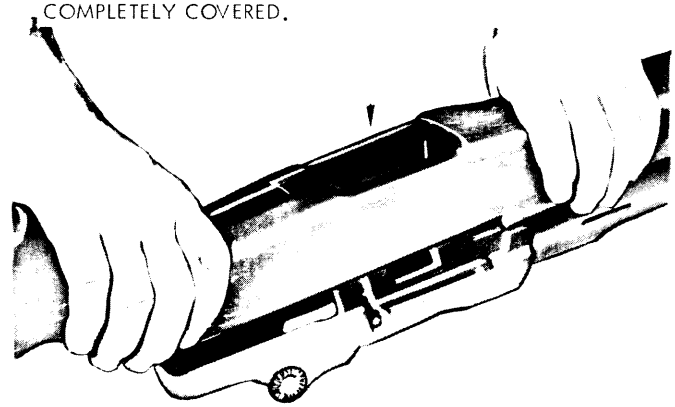


FIGURE 5

PLACE THE BARREL AND RECEIVER ASSEMBLY (RECOIL LEGS UP) AS SHOWN. ASSEMBLE THE GLASS FILLED STOCK ON TO THE RECEIVER IN THE DIRECTION INDICATED.
NOTE: WHEN THE STOCK IS FULLY SEATED ONTO THE RECEIVER, TAP THE BUTT END OF THE STOCK TO INSURE SEATING OF RECOIL SHOULDERS.

SEE PAGE 20 FOR USE OF BARREL LOCKING FIXTURE.

FIGURE 6

1. CLAMP THE TRIGGER GUARD TO WITHIN 1/4 INCH OF THE FULL LOCK POSITION. THE TRIGGER GUARD CAN BE HELD IN THIS POSITION WITH THE USE OF A U-SHAPED RETAINER AND/OR PIN.

NOTE: CAUTION SHALL BE EXERCISED TO INSURE THAT TRIGGER GUARD DOES NOT EXCEED ITS 1/4 INCH OPENING. SAFETY SHOULD BE IN "SAFE" POSITION.

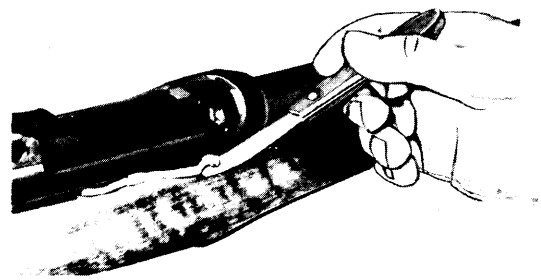
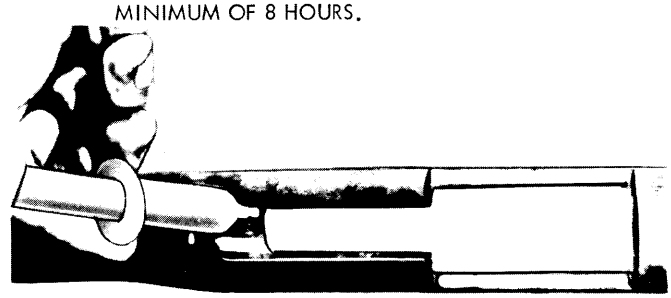


FIGURE 7

REMOVE EXCESS GLASS COMPOUND DISPLACED AFTER ACTION IS CLAMPED. FINAL TRACES OF GLASS COMPOUND SHOULD BE WIPED CLEAN.
THE COMPLETE ACTION SHALL BE ALLOWED TO DRY A MINIMUM OF 8 HOURS.



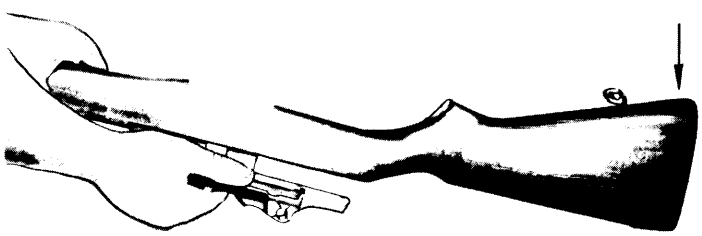


FIGURE 8

DISASSEMBLE THE BARREL AND RECEIVER ASSEMBLY FROM THE STOCK ASSEMBLY AS FOLLOWS:
1. REMOVE THE TRIGGER HOUSING ASSEMBLY.
2 HOLDING THE ASSEMBLY AS SHOWN IN FIGURE 8, STRIKE A SOLID SURFACE WITH THE BUTT END OF THE STOCK TO DISLODGE THE RECEIVER IN THE DIRECTION SHOWN.
3. EXAMINE STOCK TO INSURE THAT A DEFINITE IMPRESSION OF THE RECEIVER BEARING SURFACES HAS BEEN MADE ON THE GLASS BEDDED AREAS OF THE STOCK.
4. CLEAN ALL EXCESSES OF GLASS COMPOUND FROM METAL (RECEIVER & TRIGGER HOUSING ASSY) AND FROM ADJACENT AREAS OF BEDDED SURFACES OF STOCK.
5. IMPORTANT: MAKE SURE THAT THE MOLDED IMPRESSION OF THE RECEIVER BEARING SURFACES ARE NOT DISTURBED WHEN THE SOLIDIFIED EXCESSES OF GLASS COMPOUND ARE REMOVED.

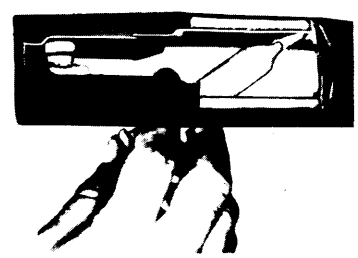


FIGURE 9

1. REDIP AND COMPLETELY SUBMERGE BOTH THE BARREL AND RECEIVER ASSY AND TRIGGER HOUSING ASSY.

2. FILL ROUTED AREAS 4, 5 AND 6 WITH AN EXCESS OF GLASS BEDDING COMPOUND.

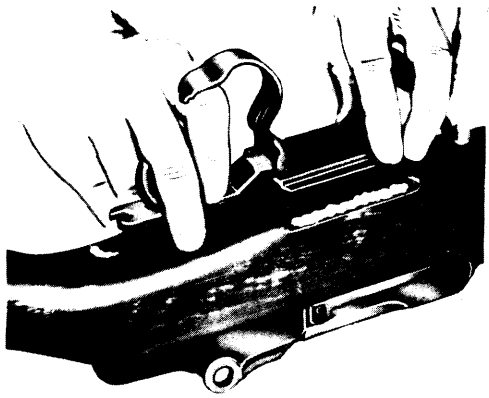


FIGURE 10

1. PLACE THE BARREL AND RECEIVER ASSEMBLY (RECOIL LEGS UP) AS SHOWN. ASSEMBLE THE GLASS FILLED STOCK (AREAS 4, 5 & 6) ON TO THE RECEIVER IN DIRECTION INDICATED.
2. CLAMP THE TRIGGER HOUSING ASSEMBLY AND POSITION THE TRIGGER GUARD WITH THE "U" SHAPED LOCK AS SHOWN IN FIGURE 11.

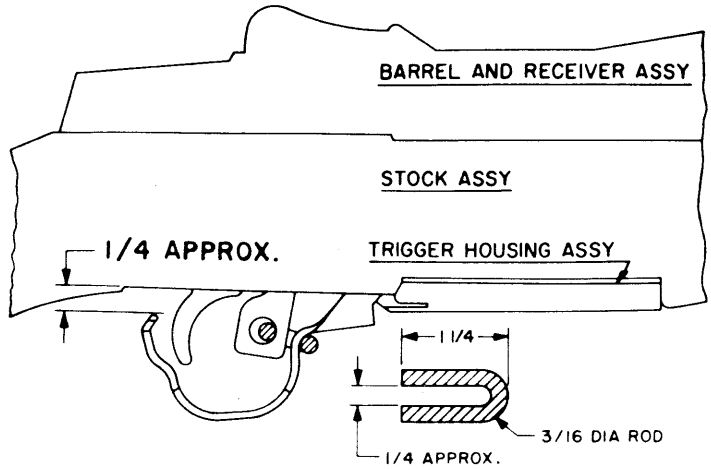


FIGURE 11

CONFIGURATION AND USE OF U LOCK.

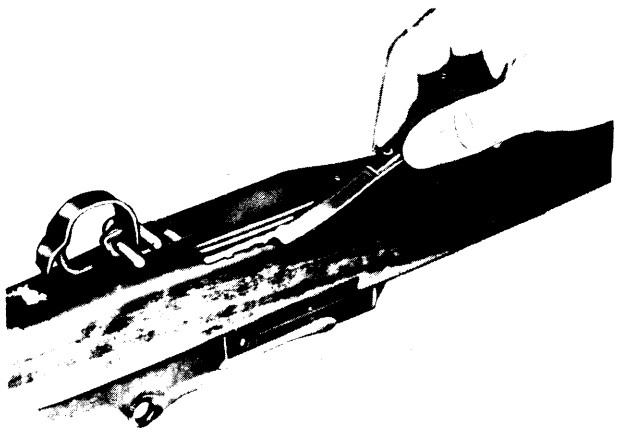


FIGURE 12.

1. REMOVE EXCESS GLASS COMPOUND FROM ACTION AS DESCRIBED IN FIGURE 7.
2. ALLOW THE ACTION TO DRY A MINIMUM PERIOD OF 8 HOURS.
3. DISASSEMBLE THE BARREL AND RECEIVER ASSEMBLY FROM THE STOCK ASSEMBLY AS DESCRIBED UNDER FIG. 8.
4. EXAMINE STOCK TO INSURE THAT A DEFINITE IMPRESSION OF RECEIVER AND TRIGGER HOUSING BEARING SURFACES HAS BEEN MADE ON GLASS BEDDED AREAS OF THE STOCK.
5. IMPORTANT: INSURE THAT THE MOLDED IMPRESSION OF THE RECEIVER AND TRIGGER HOUSING SURFACES ARE NOT DISTURBED WHEN THE SOLIDIFIED EXCESSES OF GLASS COMPOUND ARE REMOVED.

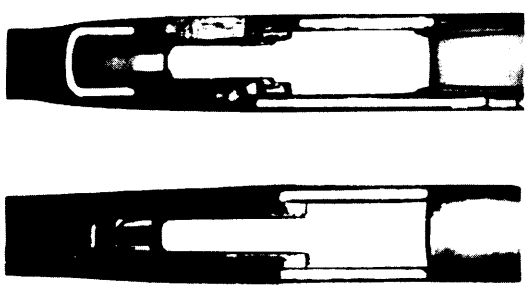
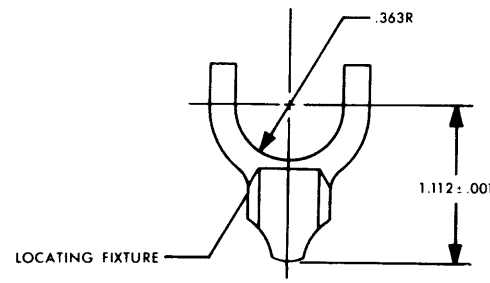
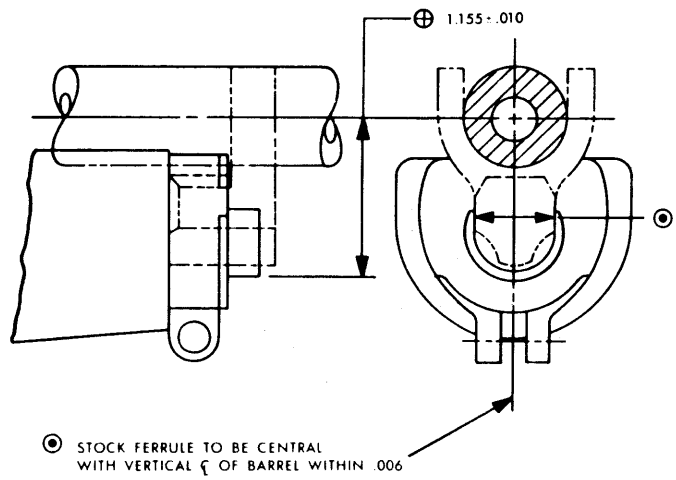


FIGURE 13

TOP AND BOTTOM VIEWS OF COMPLETED GLASS BEDDED STOCK.





QUALIFICATION OF ⊕, ⊙ REQUIREMENTS SHALL BE MAINTAINED DURING CURING OF GLASS BEDDING MATERIAL WITH BARREL AND RECEIVER ASSEMBLY, STOCK ASSEMBLY AND TRIGGER HOUSING ASSEMBLY AS SHOWN

USE OF BARREL LOCATING FIXTURE