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FINAL REPORT

SPECIAL STUDY

OF

M16A1-TYPE RIFLE

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ARMAMENT SYSTEMS DIRECTORATE

US ARMY COMBAT SYSTEMS TEST ACTIVITY
ABERDEEN PROVING GROUND, MD 21005-5059

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ABERDEEN PROVING GROUND, MD 21005-5055

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Special Study of an unidentified M16A1 rifle was done by the US Army Combat Systems Test Activity, formerly the Materiel Testing Directorate, Aberdeen Proving Ground, MD, from January 1984 to January 1985 in an attempt to determine the source of manufacture. Visual examination, physical measurements, magnetic particle and radiographic inspections, photographic documentation of detailed component differences, literature search, and technical discussions with other industries and Governmental Agencies were

20. made in order to define the characteristics of the test weapon. Results were not conclusive; however, some components were identified as probably being of South Korean origin. Further study is necessary in order to unequivocally identify location of manufacture.

DEPARTMENT OF THE ARMY
U. S. ARMY COMBAT SYSTEMS TEST ACTIVITY
ABERDEEN PROVING GROUND, MARYLAND 21005-5059

Mr. Miller/mek/283-2212

REPLY TO
ATTENTION OF

29 March 1985

STECS-AS-LA

SUBJECT: Final Report on Special Study of M16A1 Type Rifle, TECOM Project No. 9-CO-150-000-216, Report No. USACSTA-6125

Foreign Science and Technology Center
Field Support Division
ATTN: AMXST-FS

1. REFERENCES

a. Test Directive, DF from DRXST-FS, 4 January 1984, subject: Authority to Incur Costs.

b. Small Arms of the World, 12th Edition, Edited by W. H. Smith, 1983 Stockpole Co. ISBN-0-8117-1687-2.

c. System Assessment for the 5.56-MM Rifle M16A1, 20 January 1975; Headquarters, US Army Armament Command, Rock Island, IL 61201.

d. Message, P191315Z, October 1984, subject: Classification Guidance M16A1 Rifle.

e. Letter, Office of the Senior Member, United Nations Command, Military Armistice Commission, 27 August 1983.

f. Letter, Office of the Director, Defense Intelligence Agency, Ministry of National Defense, Republic of Korea, 30 August 1983.

g. Letter, Headquarters, United Nations Command, APO San Francisco 86301, 6 October 1983, subject: Captured M16 Rifle.

2. BACKGROUND

The M16A1-type rifle shown in Figure 1 was confiscated from a group of North Koreans who unsuccessfully attempted to infiltrate into South Korea by boat. Although the rifle had all the characteristics of the US service rifle, its origin of manufacture could not be immediately ascertained. There was no serial number or other recognizable manufacturer's marks. The rifle subsequently delivered to the US Army Combat Systems Test Activity (USACSTA) for analysis was one of five rifles captured.

Figure 1. General views of the unmarked M16A1 rifle.

3. TEST OBJECTIVES

a. The primary objective was to determine the origin of manufacture of the test rifle.

b. In the event that the primary objective could not be met, the secondary objective was to establish a working baseline document which accurately defines weapon characteristics. This document would then be used as the basis for further in-depth studies of the subject.

4. SCOPE

a. Testing consisted of a visual examination of each test rifle part and, where found to be different than a part of known US manufacture, photographs were taken showing these differences. Any areas of suspected defacement were subjected to radiographic (X-ray), magnetic particle (ferrous components), or die penetrant (nonferrous components) inspections.

b. During the inspection phase, informal discussions were held with personnel from the United States Treasury: Bureau of Alcohol, Tobacco and Firearms; and Colt Industries, one of the US producers of M16A1 rifles and the sole operator/licensee of OCONUS factories which produced M16A1 rifles.

c. A literature search was made concurrently with the inspections and technical discussions with contractor and Government personnel.

5. SUMMARY OF FINDINGS

a. The weapon submitted for analyses is a high-quality rifle composed of production-quality components. All parts of the test rifle appear to be fully interchangeable with CONUS-produced M16A1 rifle parts.

b. All markings found on the test rifle are in English. There is no alteration of those markings. They are found at the following locations:

(1) Lower receiver (fig. 2-68).

(2) Buttstock (fig. 2-126).

(3) Black plastic rifle grip (fig. 2-122).

(4) Front sight (fig. 2-41).

(5) Rear sight (fig. 2-43).

(6) Upper receiver (fig. 2-8).

5 (Cont'd)

c. Parts with markings which appear to have been removed prior to application of the surface finish are found at the following locations:

(1) Upper receiver (fig. 2-8).

(2) Front sight (fig. 2-24).

d. Markings which did not appear on parts that normally have some type of marking are found at the following locations:

(1) Barrel - No C marking for chrome plated bore (fig. 2-21).

(2) Bolt - No MP or MPC marking for proof and magnetic particle inspection (fig. 2-60).

(3) Handguard liner - No right/left markings (fig. 2-47).

e. There were 44 parts which exhibited technical differences, although still conforming to basic design shape and function.

(1) The most noticeable of these differences are listed as follow:

(a) Forward assist - Change in plunger cap configuration (fig. 2-66).

(b) Extractor spring buffer - Change in color/material (fig. 2-63).

(c) Selector - Change in lever configuration (fig. 2-77).

(d) Bolt catch - Change in thumbpiece configuration (fig. 2-89).

(e) Stowage door - Change in front and rear surface configuration (fig. 2-116 and 2-117).

(f) Magazine components - Design changes (fig. 2-140 to 2-164).

(2) Other parts which exhibited more subtle differences are as follow:

(a) Rear sight windage drum.

(b) Gas tube.

(c) Ejection port cover.

(d) Bolt carrier and key assembly.

(e) Forward assist pawl.

(f) Forward assist plunger body.

(g) Forward assist plunger spring.

(h) Front pivot pin.

(i) Trigger guard.

(j) Automatic sear assembly.

(k) Magazine catch assembly.

(l) Trigger.

(m) Disconnector.

(n) Hammer assembly.

(o) Lower receiver extension.

(p) Butt cap screw.

(q) Stowage door latch.

(r) Butt cap.

(s) Butt plate access door hinge.

(t) Stock swivel screw.

(u) Stock swivel.

(v) Buffer assembly.

f. A chronological listing of design and manufacturing changes of major scope and their dates of approval are given in Enclosure 3, Table 1.

g. The test rifle is assembled from parts which generally fall within an identifiable design time interval of 1970 to 1975. The major components used in this determination are as follow:

(1) Barrel - Chrome plated bore.

(2) Gas tube - long bend.

(3) Buttstock - Stowage compartment with unplated latch.

(4) Magazine - Thirty round, with tangential curve body.

(5) Bolt - Bearing surface phosphated.

(6) Front sight - Drilled through sight post hole.

(7) Bolt carrier - side staked key screws and plated internal surface for bolt and key.

(8) Extractor spring insert - white color found after 1975 in Colt production rifles.

(9) Handguard - 1963 to 1968. Four instead of five support ribs.

Not covered in this major component analysis is the lower receiver surface treatment (shot peened).

h. Known sources of US Government contracted M16A1 rifle manufacture in the United States have been Harrington and Richardson, General Motors Corp., and Colt Industries (encl 2, fig. 2-2). All three producer's rifles were made to the same Technical Data Package drawings and specifications and therefore all component parts from these manufacturers are, with some exceptions, indistinguishable from each other when removed from their original packaging/weapon.

i. Known sources of foreign production M16A1 rifles, made under license to Colt Industries, with US Government approval, were the Republic of the Philippines (Elisco Tool Co.), South Korea, and Singapore (Chartered Industries of Singapore, Limited) (encl 2, fig. 2-3 and 2-4). Only South Korea produced all component parts for their rifles. None of these three manufacturers is currently in production. Exact dates of production startup and completion of contracts if not known; however, most production occurred in the 1970 decade.

j. There have been several nongovernment contract producers/distributors of upper and lower receivers made in the USA in the 1970s. Only one is currently selling lower receivers on the open market; the others having been barred from further manufacture/sales due to court mandated injunctions. The upper and lower receivers sold by these firms, while generally conforming to M16/M16A1 rifle configuration, do not exhibit the extremely high quality fit and finish of the test rifle receiver. The surface smoothness and hand finishing used to break sharp corner surfaces of the other test rifle components is also better, even though found on Colt-produced weapon parts.

k. Based on the results of the inspection, discussions with representatives of the US Treasury (BATF) and Colt Industries, and a search of available literature, the following hypotheses are made:

(1) The lack of markings on some parts of the test rifle may indicate that the rifle was a toolroom or prototype production item.

(2) While use of a bolt assist device, bolt latch, buttstock stowage door and butt cap assembly configured to South Korean design indicates possible source of manufacture, it is not absolute proof that the entire rifle was made at the same location. According to representatives from Colt Industries, their foreign contracts generated surplus component parts which remained after completion of weapon production. There is the possibility that those excess parts were disposed of on the open market as scrap or salvaged merchandise.

6. CONCLUSIONS

It is concluded that:

a. The primary objective of this study to determine origin of the test rifle manufacture could not be met within the funding limitations of the program.

b. The basic characteristics of design and manufacture have been documented so that further investigations can be initiated, if desired, with a minimum amount of work duplication.

c. Metallurgical examination of each part must be made in order to isolate source of manufacture. This requires that the manufacturing specifications of each producer also be known.

d. Although some rifle components have been identified as South Korean manufacturing type, the evidence is insufficient to classify the rifle as South Korean made.

7. RECOMMENDATIONS

It is recommended that copies of this report be distributed to Colt Industries and the US Treasury Department, Bureau of Alcohol, Tobacco and Firearms as a means of getting further input into tracing the origin of manufacture of the test rifle.

FOR THE COMMANDER:

Paul E Kertis

PAUL E. KERTIS
Director, Armament System
Directorate

4 Encl
1. Correspondence
2. Essential Data Summaries
3. M16A1 Rifle Design List
4. Distribution List

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CORRESPONDENCE

OFFICE OF THE SENIOR MEMBER
UNITED NATIONS COMMAND
MILITARY ARMISTICE COMMISSION

SM

27 August 1983

Lieutenant General Choi Sung Taik
Director, Defense Intelligence Agency
Republic of Korea Ministry of National Defense

Dear General Choi:

First, I would like to take this opportunity to thank you for your untiring support for the successful mission of the United Nations Command Military Aristice Commission. Especially noteworthy was the most timely assistance and cooperation rendered by your Agency and the ROK Navy for the effective investigation of the north Korean hostile acts on the high seas on 1[illegible] August of this year. With your timely assistance in our investigation we were able to support our charges against the north and at the same time refute the outrageous north Korean allegation that the ROK Navy sank an innocent north Korean fishing boat on the high seas.

On 5 August of this year, for the first time, the north Korean armed personnel who attempted to infiltrate into the ROK through the beach near Kampo carried M-16 automatic rifles which had no serial numbers on them. This is a very serious matter when we consider some 100,000 well trained north Korean commandoes are now able to disguise themselves as ROK Army soldiers by wearing imitation ROK Army uniforms and carrying these M-16's. I believe you will agree with me that such hostile operations by the north directed against the ROK must be prevented. In order to do so, it is essential that we locate the source of these M-16 automatic rifles and the supplier of these weapons to the north Koreans. It is, therefore, requested that one of these M-16's carried by the north Korean armed infiltrators on 5 August be provided to the United Nations Command within a week or two so that it can be thoroughly examined by experts from the Foreign Science and Technology Center in the United States. It is entirely possible that the weapon may be destroyed during the process of analysis. But, the remainder of the weapon will be returned to the ROK upon completion of the analysis.

As always, I appreciate your keen interest in and support of the mission of the United Nations Command and your untiring efforts in our common interest to deter north Korean aggression and reduce tension in this peninsula.

With warmest personal regards,

F. WARREN KELLEY
RADM USN
SENIOR MEMBER, UNCMAC

OFFICE OF THE DIRECTOR
DEFENSE INTELLIGENCE AGENCY
MINISTRY OF NATIONAL DEFENSE
REPUBLIC OF KOREA

30 August 1983

Dear Admiral Kelley:

Thank you for your letter dated 27 August 1983.

First, I would like to pay my respect to your courageous efforts in successfully protesting the recent provocations by the north and also effectively refuting their slanderous counter-propaganda during the recent two MAC meetings. I believe this was possible due to your professional military leadership and combined efforts of your staff.

I concur with you on your proposal for thorough examination of the source of M-16 rifles. In fact, we were also planning a thorough examination by our own experts. Thus, I welcome your proposal to provide the rifle to an examination by experts from the Foreign Science and Technology Center in the United States.

However, the Defense Committee of the National Assembly, Republic of Korea will hold a meeting on 5 September for hearing of our comprehensive report on recent incidents and future prospects of the north Korean infiltration. We plan to display at the Committee meeting all equipment captured during the two recent operations. Therefore, I assure you that we will deliver to your Command one of these rifles after completion of the meeting.

Again, I wish to express my deep appreciation for your dedicated efforts. I solicit your continued assistance for the peace and stability on the Korean peninsula as well as for further improvement of friendly relations between the United States and the Republic of Korea.

With warmest personal regards.

Sincerely,

CHOI, SUNG TAIK
LTG, ROKA
Director

Rear Admiral F. Warren Kelley
Senior Member, Military Armistice Commission
United Nations Command

HEADQUARTERS, UNITED NATIONS COMMAND
APO SAN FRANCISCO 96301

AA

6 October 1983

SUBJECT: Captured M-16 Rifle

Commander
Foreign Science Technology Center
220 7th Street - NE
Charlottesville, Virginia 22901

1. On 5 August 1983, five north Korean agents attempted an infiltration into the Republic of Korea (ROK) which was successfully repulsed by the ROK defenders. During the incident five M-16 rifles were captured which were presumably carried by the infiltrators. The M-16's are similar, but not identical, to those of US manufacture and have no serial numbers or manufactures stamp.

2. Of immediate concern to this command is the country of manufacture of the weapons which may provide a clue as to how the north Koreans procured the weapons. On 17 September 1983 one of the captured weapons was turned over to Science and Technology Center, Far East Office in Yokota Air Base Japan for further transfer to your organization.

3. Enclosed for your information are copies of the correspondence between the Military Armistice Commission (MAC) and the ROK officials concerning the analysis of the weapon. Please note the comment where we promised the weapon, or remains thereof, would be returned to the ROK after your analysis. Your analysis should not be constrained by the promise but we will need feedback to provide to the ROK officials. That is, if the weapon is destroyed by your examination procedures I would need to know that for further transmission to the ROK officials. On the other hand if the weapon is still recognizable after your analysis we are committed to returning the weapon, or parts thereof, to the ROK.

4. Obviously this issue has high interest here in Korea and your cooperation is much appreciated. Please send the results of your research to me at the above address.

2 incl
as

ROBERT D. ALHOUSE
COL, USA
Secretary, UNCMAC

6 October 1983

SUBJECT: Captured M-16 Rifle

CF:
USFSTC
Field Support Division
Building 642
Aberdeen Proving Grounds, Maryland 21005

Commander
Science and Technology Center
Far East Office
APO San Francisco 96328

ESSENTIAL DATA SUMMARIES

Key to the Use of Essential Data Summaries.

The essential data summaries are organized by major assembly groupings. First is the upper receiver and barrel assembly, followed by the lower receiver assembly, and last is the magazine assembly.

Within each of the major assembly groupings, there are tables which list the characteristic differences and/or similarities between test rifle parts and parts of known US manufacture. Following each table is one or more figures depicting the part discussed in the table with appropriate indicators (arrows). These letter keyed arrows point to the areas on each part which is a point of discussion in the table. Some figures will also contain reference to other figures. These references are used to correlate different views of the same part, when more than one part of the same kind is shown.

Preceding the tables and figures is an index of contents. If information on a particular part is desired, refer to the page number listed. If a part is not listed in this index, that omission indicates that there is no visually discernable difference between test rifle and other components of known US manufacture.

(Page 2 Blank)

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TABLE 2-1. BARREL BORE MEASUREMENTS, GIVEN IN INCHES[a]

Rifling Sets	Measured From Muzzle[b]							Measured From RFB[c]				
	0.10	0.60	1.10	1.60	2.10	2.60	3.00	2.60	2.85	3.00	3.35	3.50
Land Diameter (0.2190 Basic Gage Setting)												
1 and 4	0.2215	0.2217	0.2203	0.2206	0.2200	0.2200	0.2217	0.2205	0.2206	0.2214	0.2201	0.2202
2 and 5	.2230	.2214	.2208	.2209	.2207	.2215	.2203	.2211	.2201	.2203	.2202	.2201
3 and 6	.2220	.2212	.2212	.2215	.2214	.2220	.2205	.2206	.2204	.2208	.2204	.2202
Groove Diameter (0.2235 Basic Gage Setting)												
1 and 4	0.2253	0.2260	0.2262	0.2250	0.2250	0.2254	0.2250	0.2247	0.2246	0.2250	0.2245	0.2243
2 and 5	.2269	.2260	.2258	.2260	.2255	.2258	.2250	.2246	.2243	.2244	.2248	.2252
3 and 6	.2260	.2258	.2254	.2254	.2243	.2258	.2252	.2248	.2251	.2251	.2248	.2249

[a]Measurements obtained with an air gage. Barrel was chrome plated chamber only. There were six lands and grooves of one turn in 12 inches, right hand twist.
[b]Measured with flash supressor removed.
[c]RFB = Rear face of barrel extension.

Note: Rusted condition of barrel, due to sea water corrosion, prevented full measurement of the lands and grooves throughout the bore. US made M16A1 rifle bore dimensions are 0.2190 to 0.2200 land diameter, and 0.2235 to 0.2245 groove diameter. The slightly larger dimensions reported for the test rifle bore is primarily caused by the sea water corrosion, since the rifle appears to have had only a small number of rounds fired through it prior to capture.

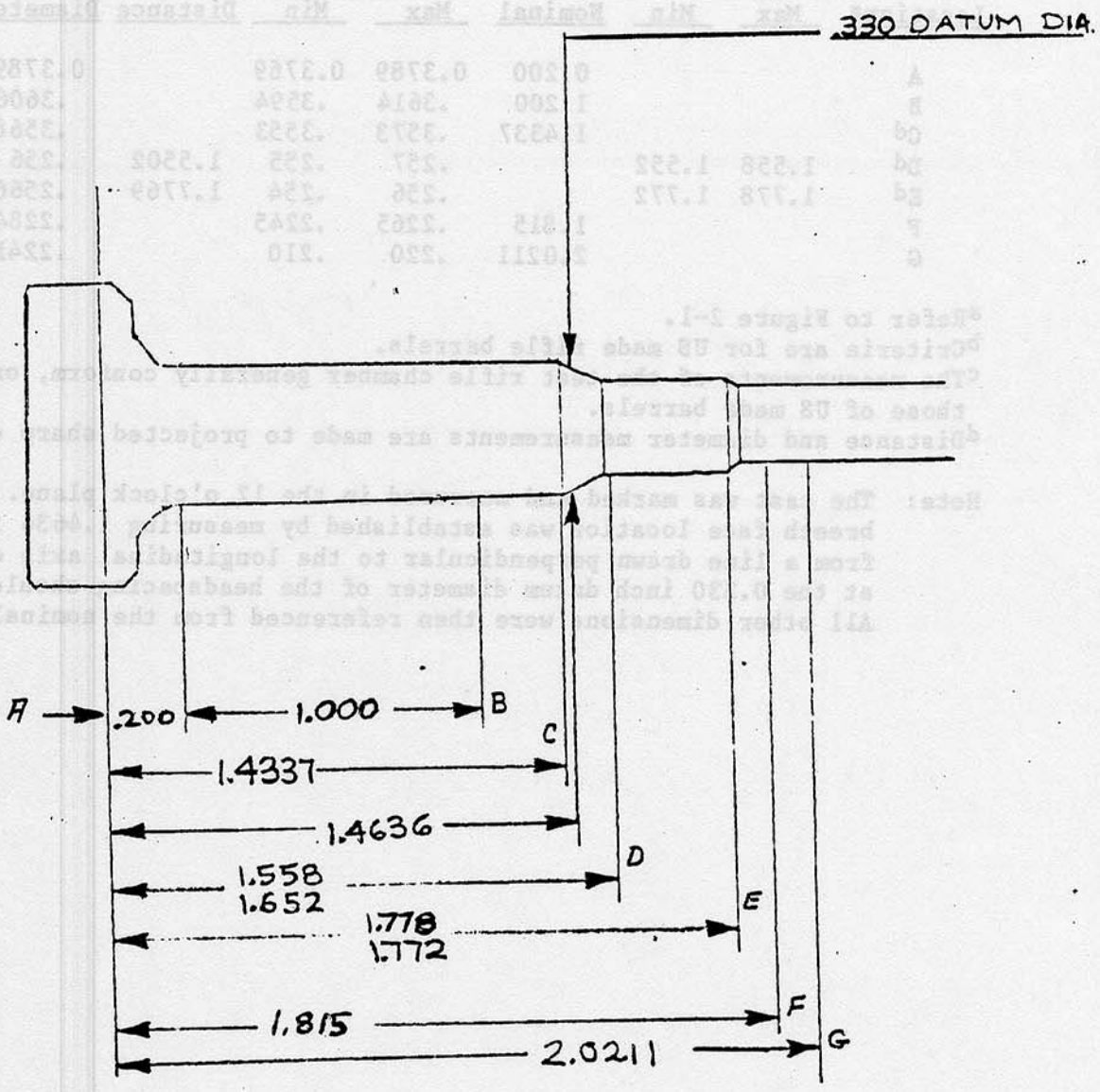


Figure 2-1. Chamber cast measurement locations (letters) and dimensions, in inches.

TABLE 2-2. MEASUREMENT OF BARREL CHAMBER CAST, IN INCHES

Diameter Location[a]	Criteria[b] Distance Max	Distance Min	Distance Nominal	Diameter Max	Diameter Min	Actual Measurement Distance	Actual Measurement Diameter	Measurement in Spec[c] Dist	Measurement in Spec[c] Dia
A			0.200	0.3789	0.3769		0.3789	-	Yes
B			1.200	.3614	.3594		.3606	-	Yes
C[d]			1.4337	.3573	.3553		.3568	-	Yes
D[d]	1.558	1.552		.257	.255	1.5502	.256	No	Yes
E[d]	1.778	1.772		.256	.254	1.7769	.2566	Yes	No
F			1.815	.2265	.2245		.2284	-	No
G			2.0211	.220	.210		.2241	-	No

[a]Refer to Figure 2-1.
[b]Criteria are for US made rifle barrels.
[c]The measurements of the test rifle chamber generally conform, or are close to those of US made barrels.
[d]Distance and diameter measurements are made to projected sharp corners.

Note: The cast was marked and measured in the 12 o'clock plane. Nominal breech face location was established by measuring 1.4636 inches back from a line drawn perpendicular to the longitudinal axis of the chamber at the 0.330 inch datum diameter of the headspacing shoulder. All other dimensions were then referenced from the nominal breech face.

TABLE 2-3. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - UPPER RECEIVER

Figure No.	Description
2-5, 2-6, 2-7	Right side view. Case deflector. Profile (A). Test rifle part has a thinned area starting at the top of the ejection port and extending downward for its length.
2-8, 2-9, 2-10	Right side view. Location of grind marks underneath annodized finish, in location normally found to contain as-cast manufacturers code letters (A). Rear sight windage direction markings (letter R recessed instead of raised (C), length of letter L (B)).
2-11, 2-12, 2-13	Left side view. Absence of raised mold mark (A).
2-14, 2-15, 2-16	Front and rear views. Surface finish and machine marks on front of carrying handle (A), orientation of gas tube hole (B), thickness of charging handle shield (C), and surface finish of bolt assist device housing area (D).
2-17, 2-18, 2-19	Top and bottom views. Profile of case deflector (A), surface finish of machined rear right cavity (B), surface finish of machined charging handle groove (C).

Note: The letters in ( ) refer to the arrow indictors on the figures.

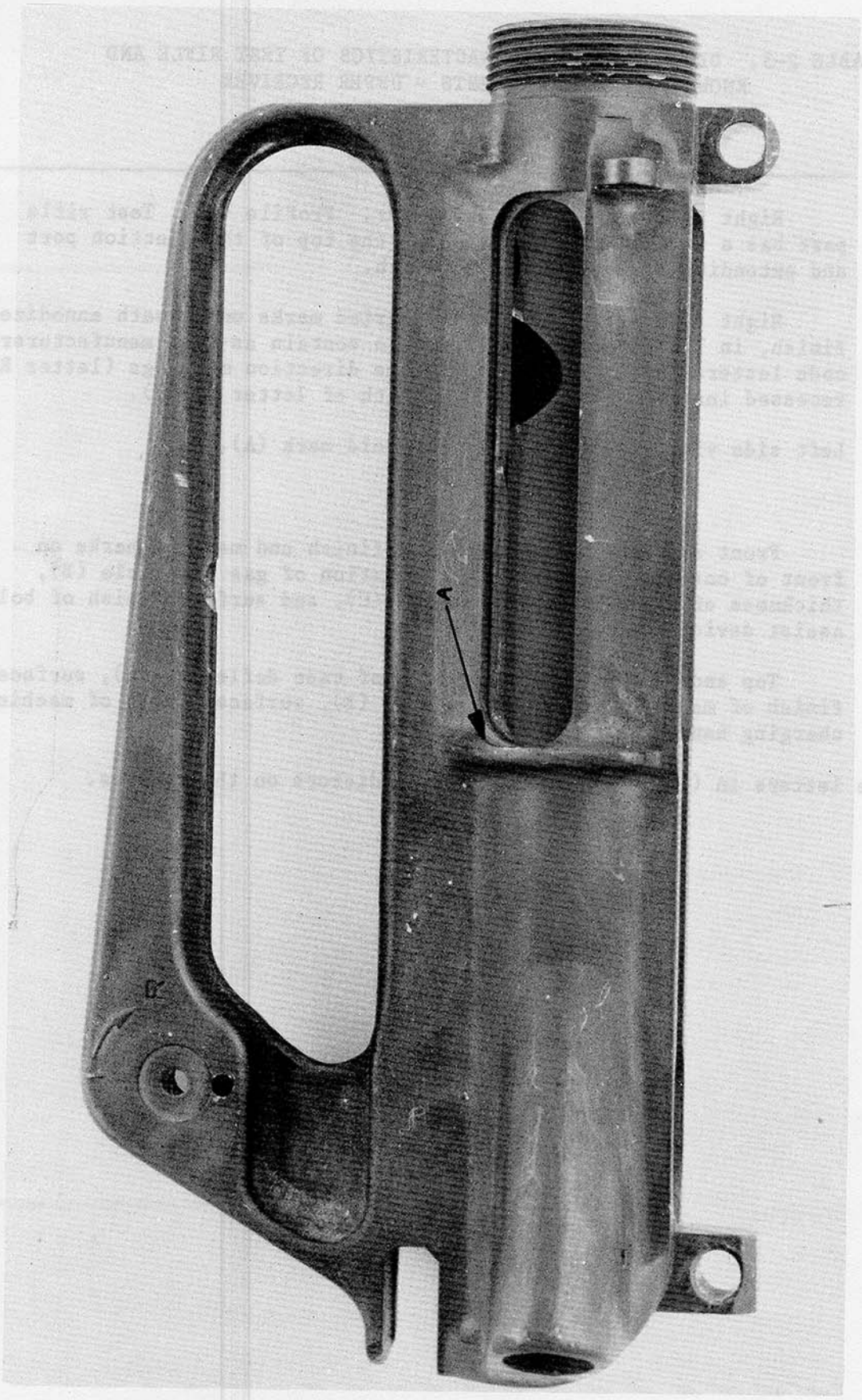


Figure 2-5. Test rifle upper receiver.

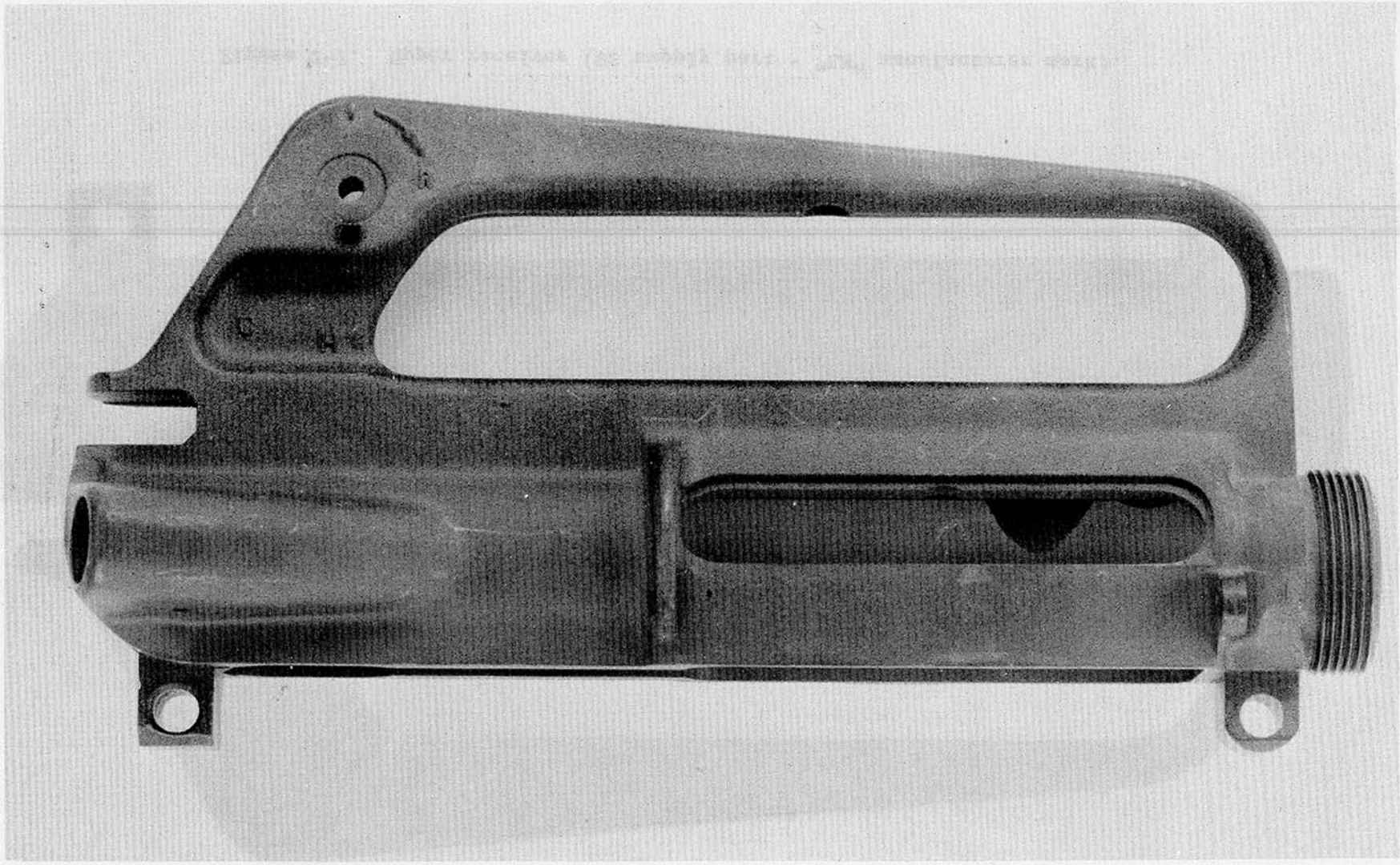


Figure 2-6. Upper receiver (US supply part - "CH" manufacturer mark).

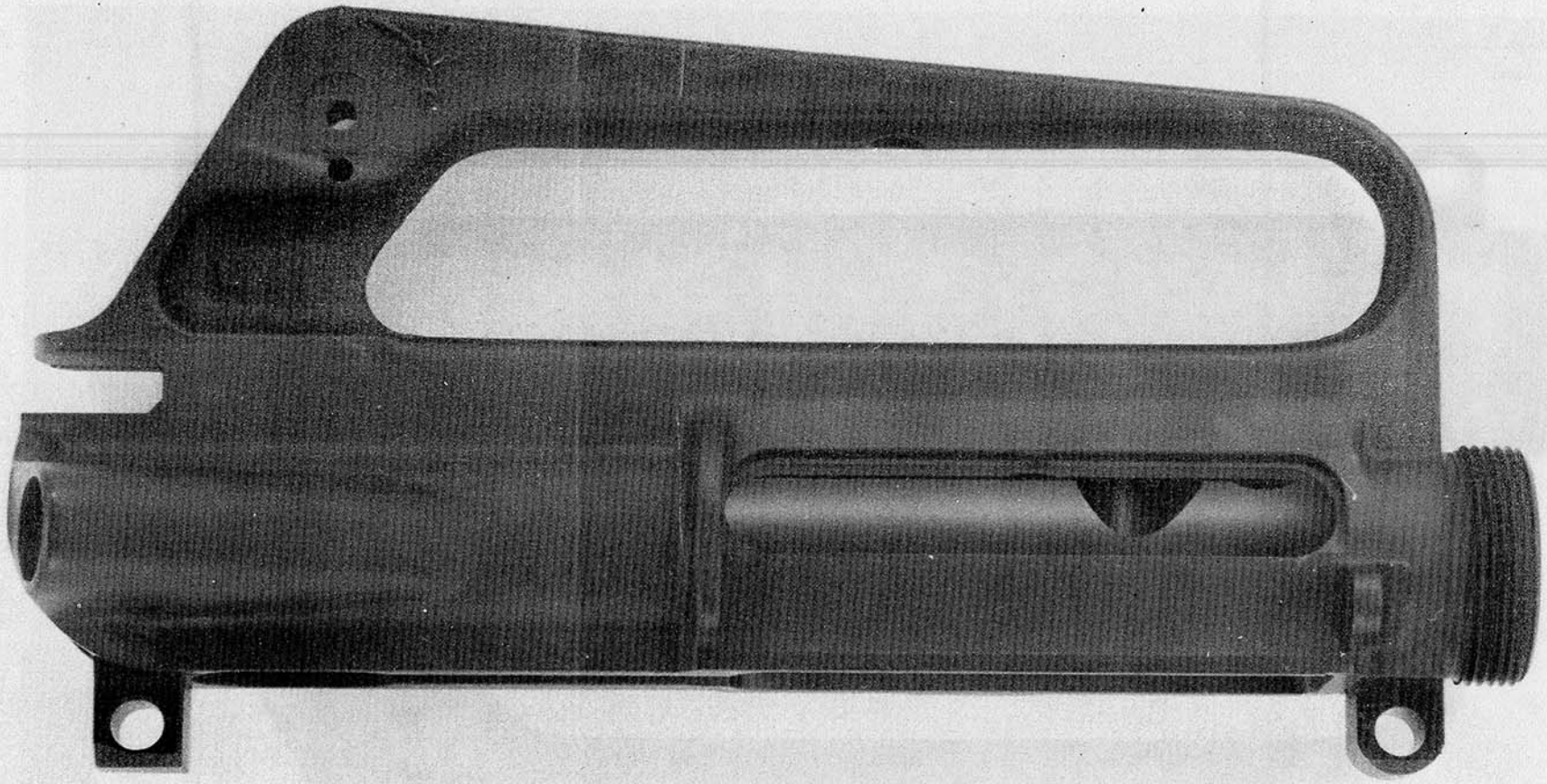


Figure 2-7. Upper receiver (US supply part - "LM" manufacturer mark).

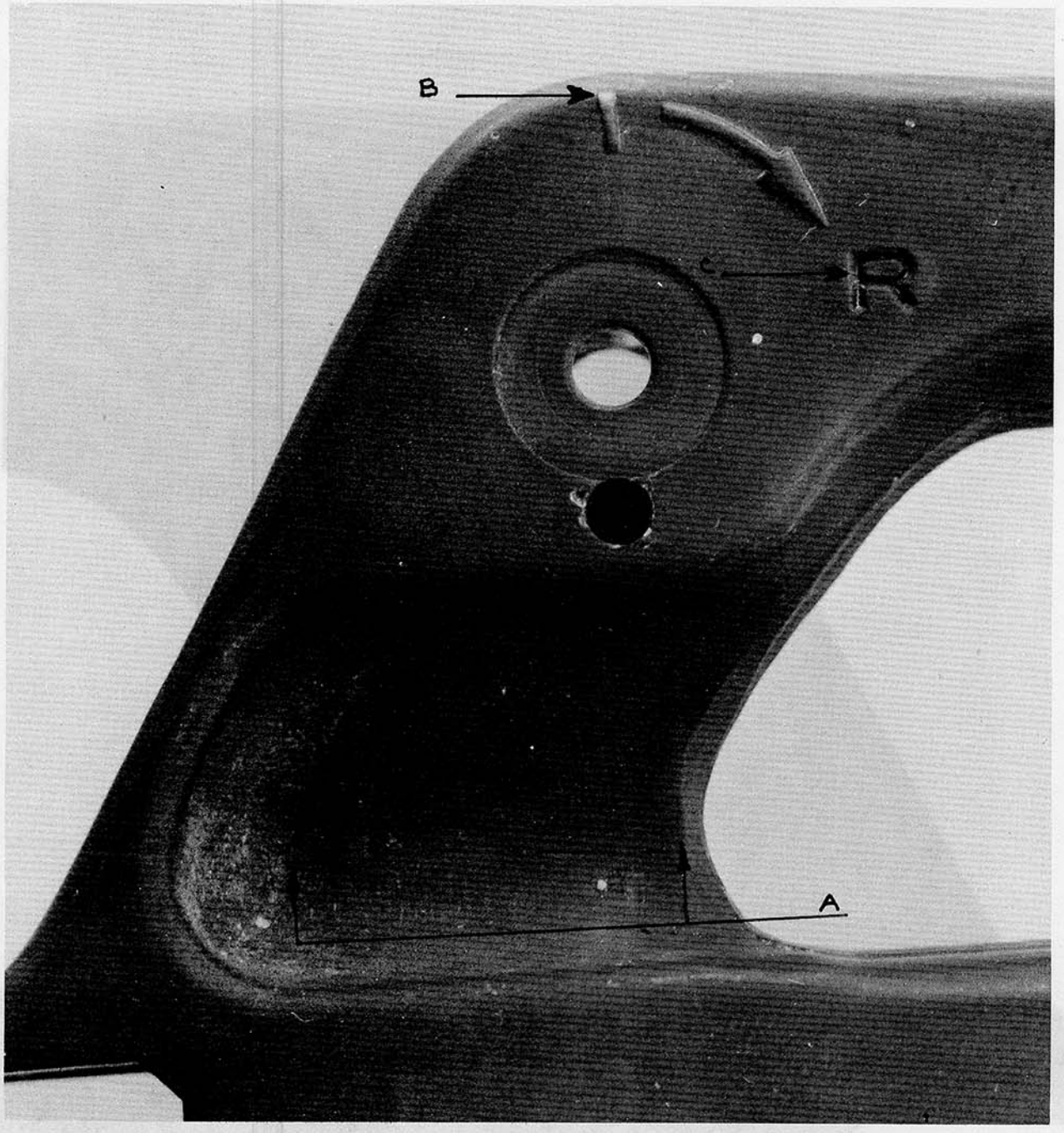


Figure 2-8. Test rifle upper receiver.

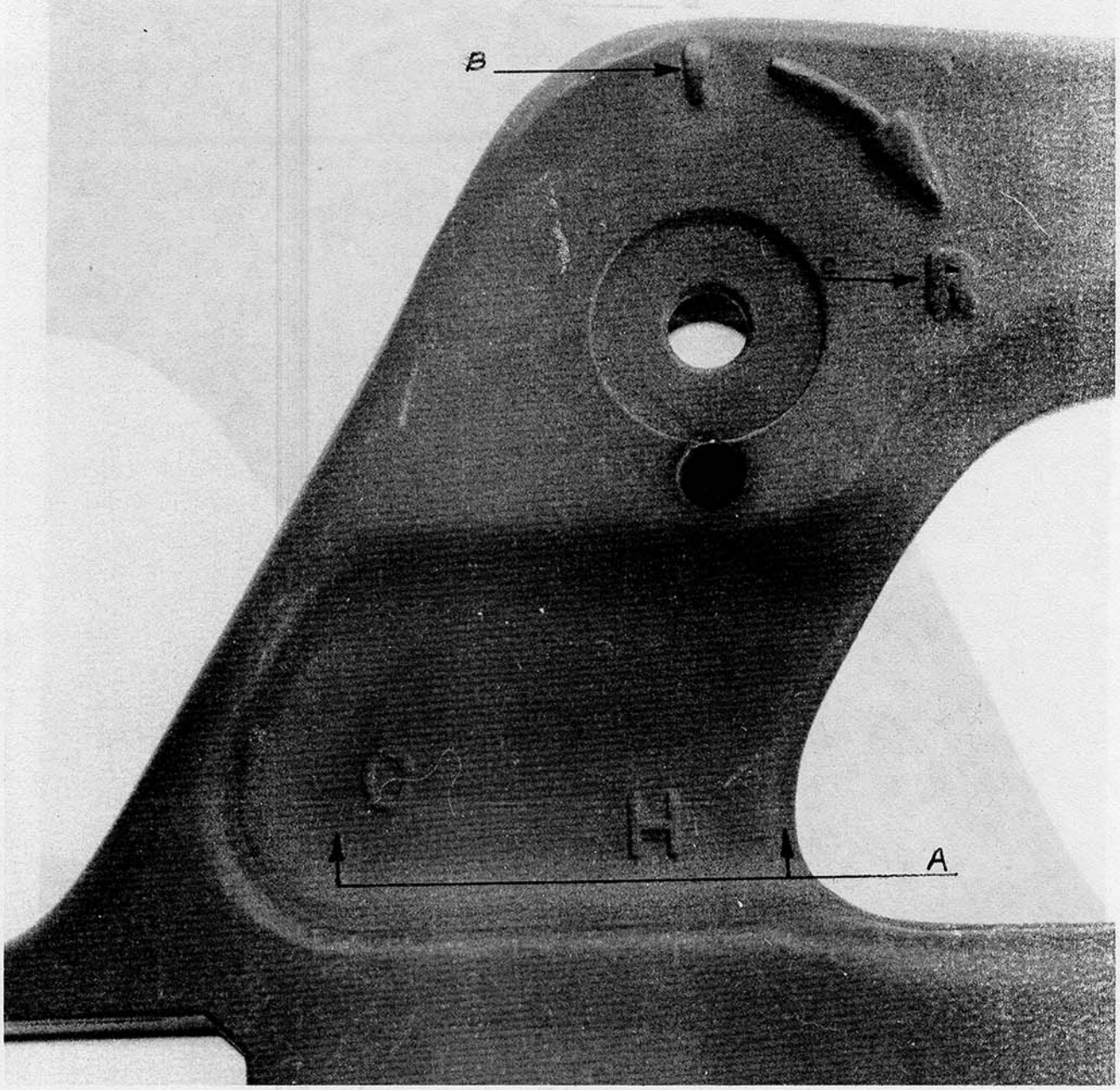


Figure 2-9. Upper receiver (US supply part - "CH" manufacturer mark).

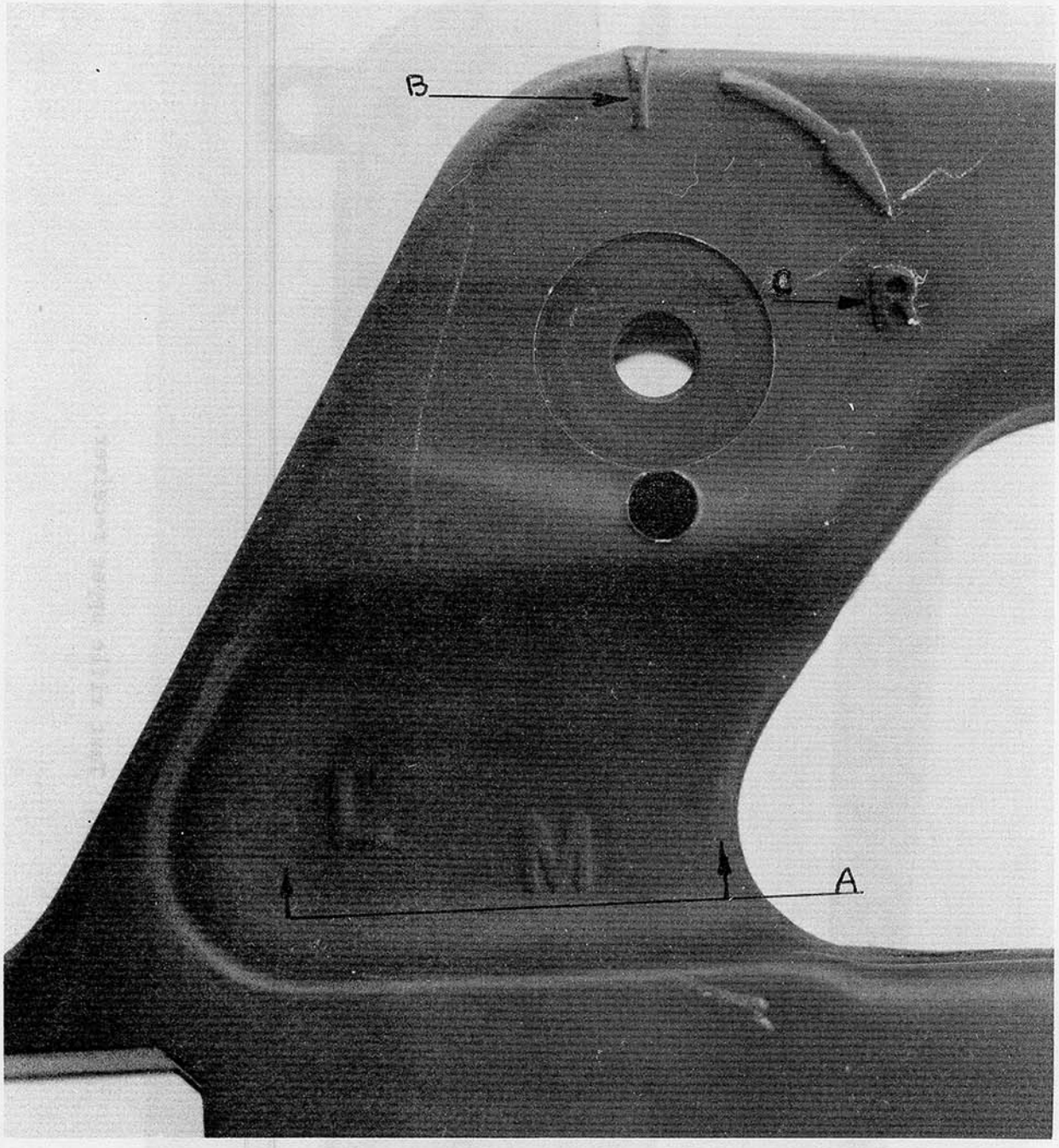


Figure 2-10. Upper receiver (US supply part - "LM" manufacturer mark).

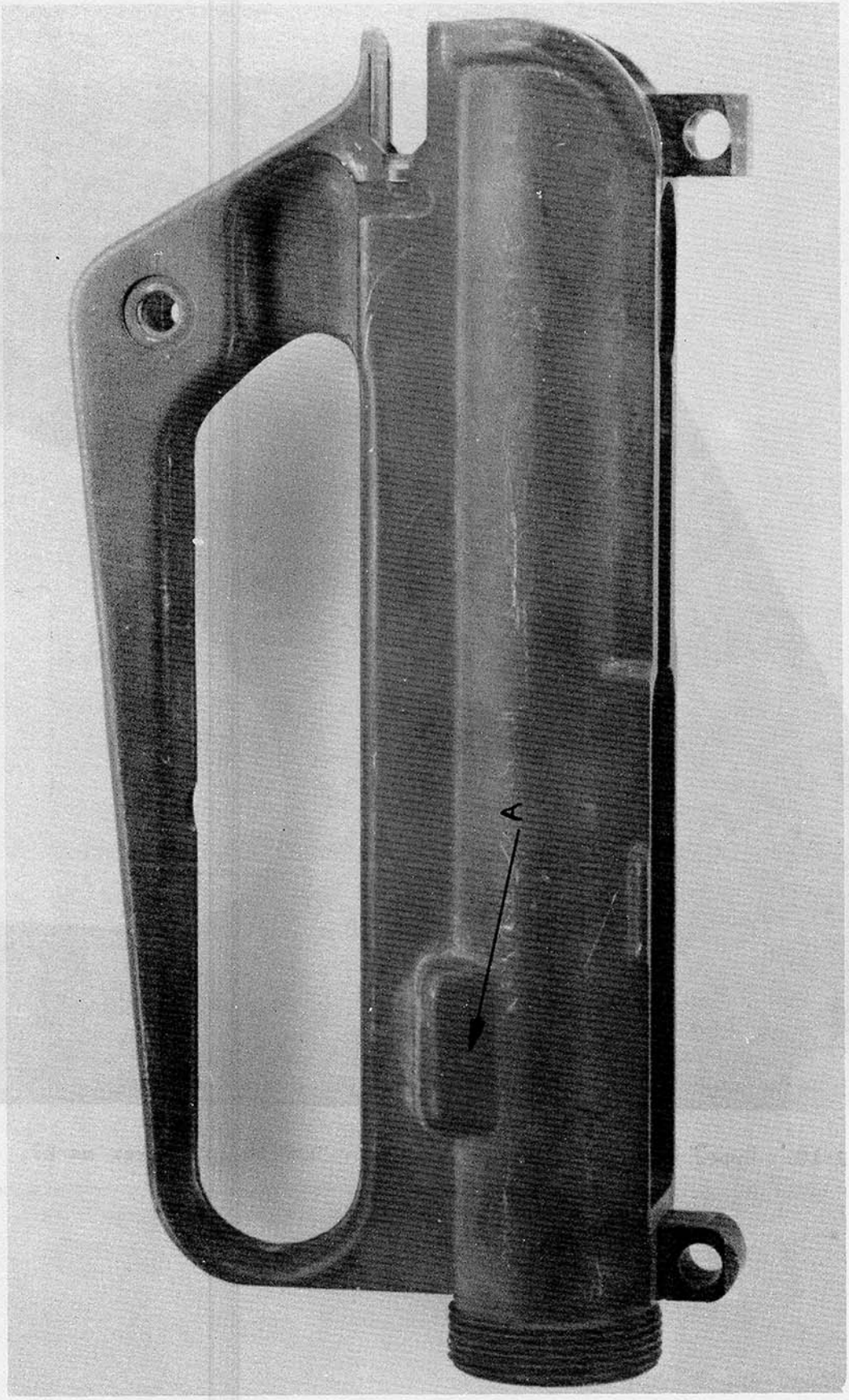


Figure 2-11. Test rifle upper receiver.

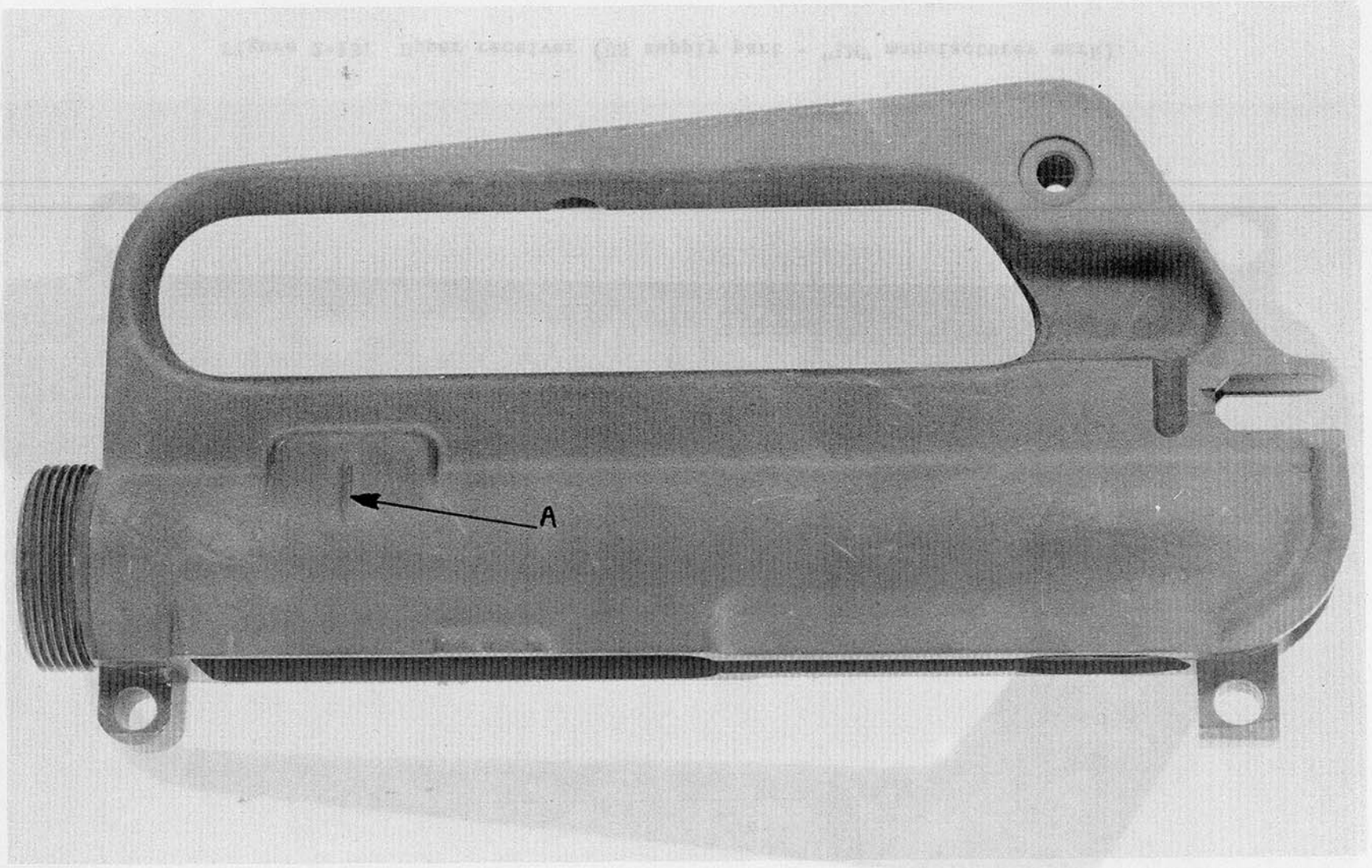


Figure 2-12. Upper receiver (US supply part - "CH" manufacturer mark).

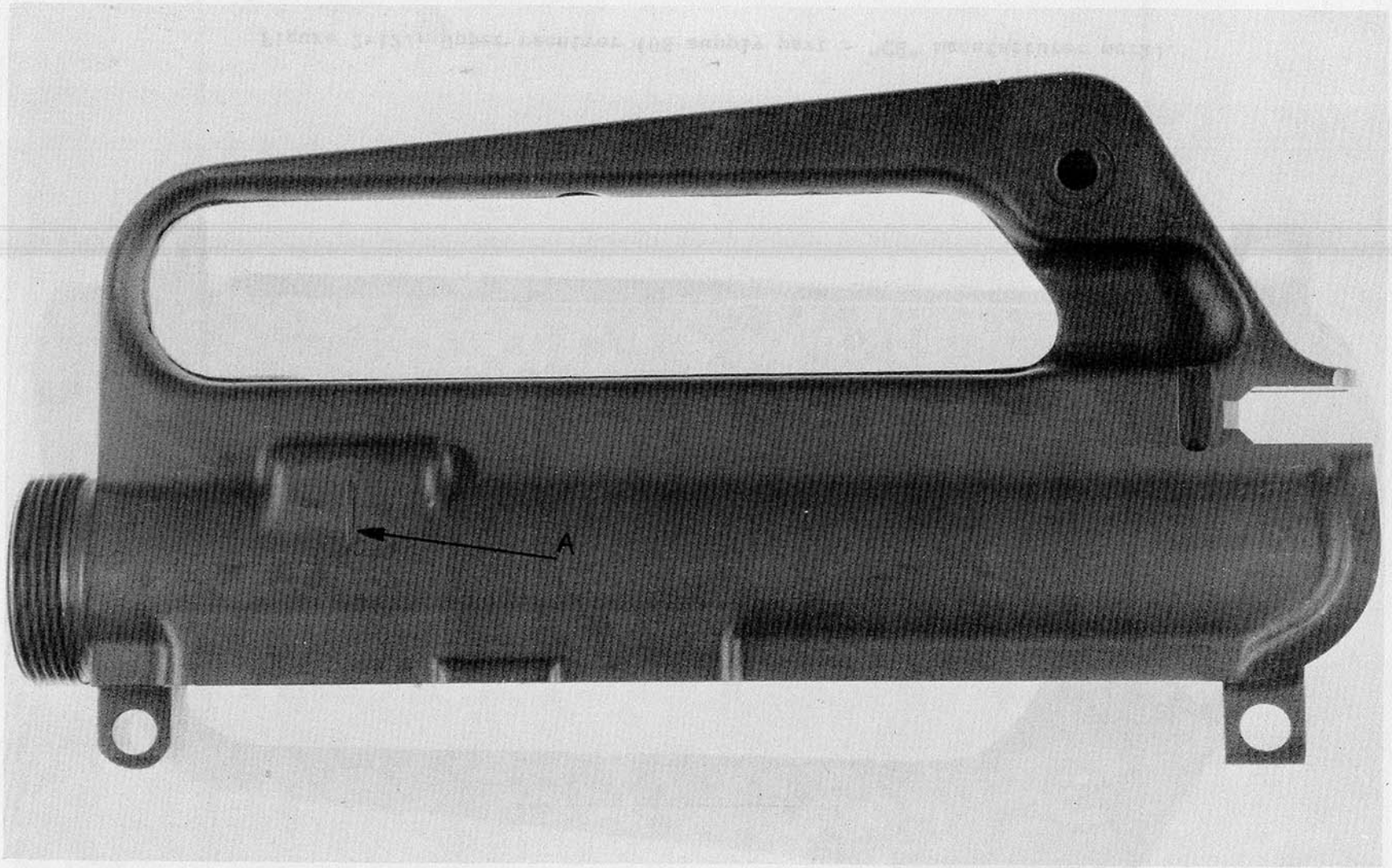
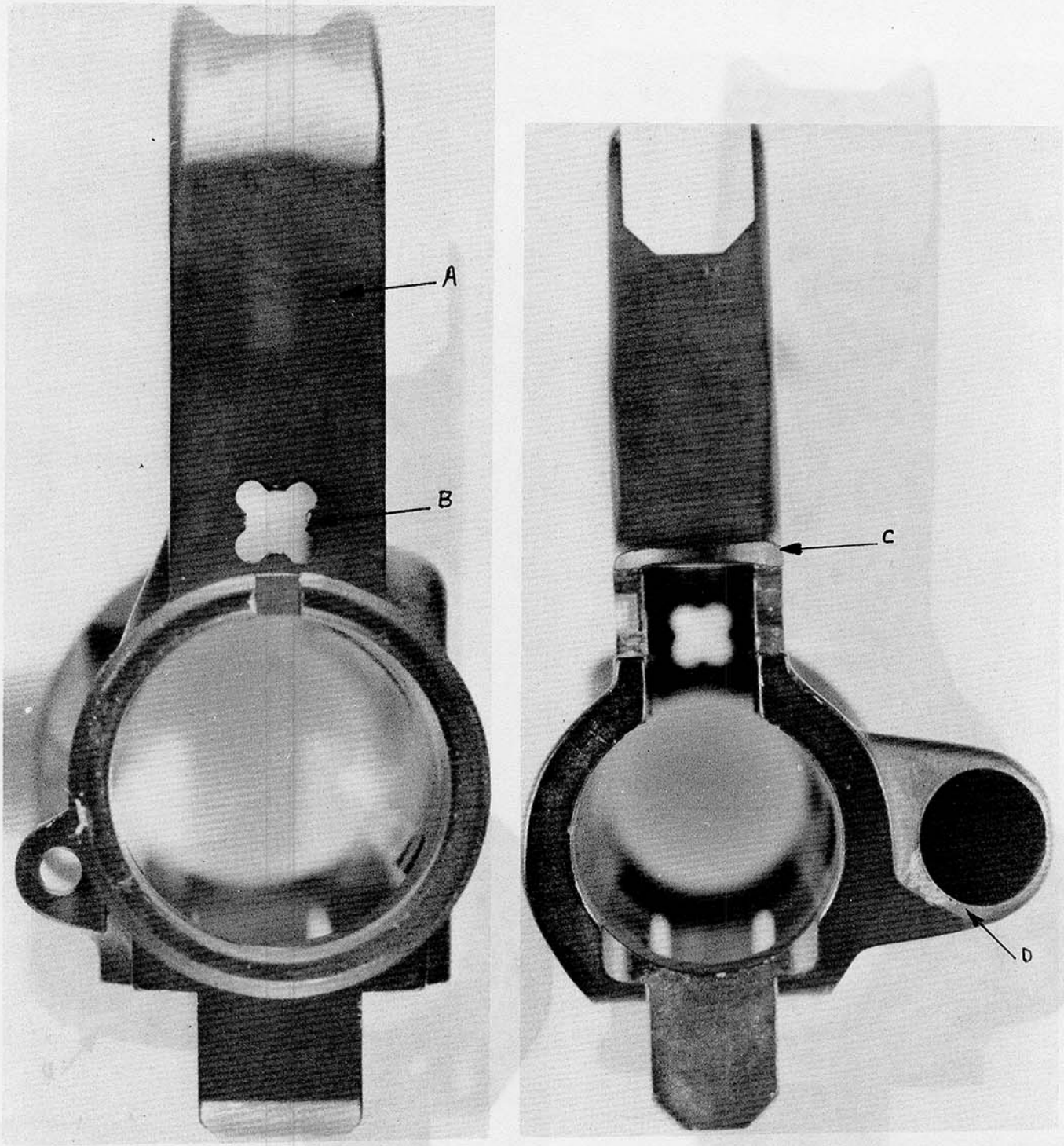


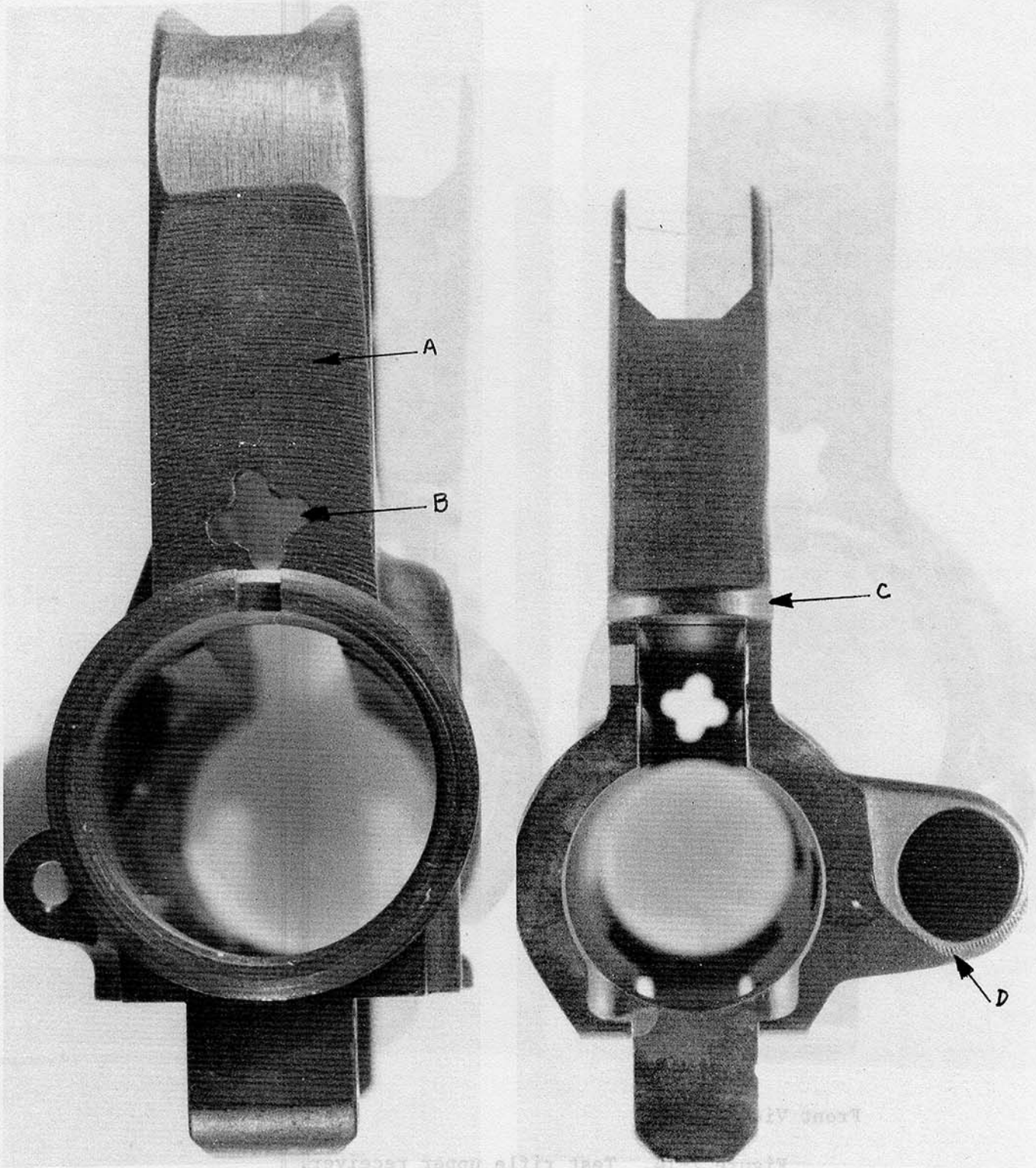
Figure 2-13. Upper receiver (US supply part - "LM" manufacturer mark).



Front View

Rear View

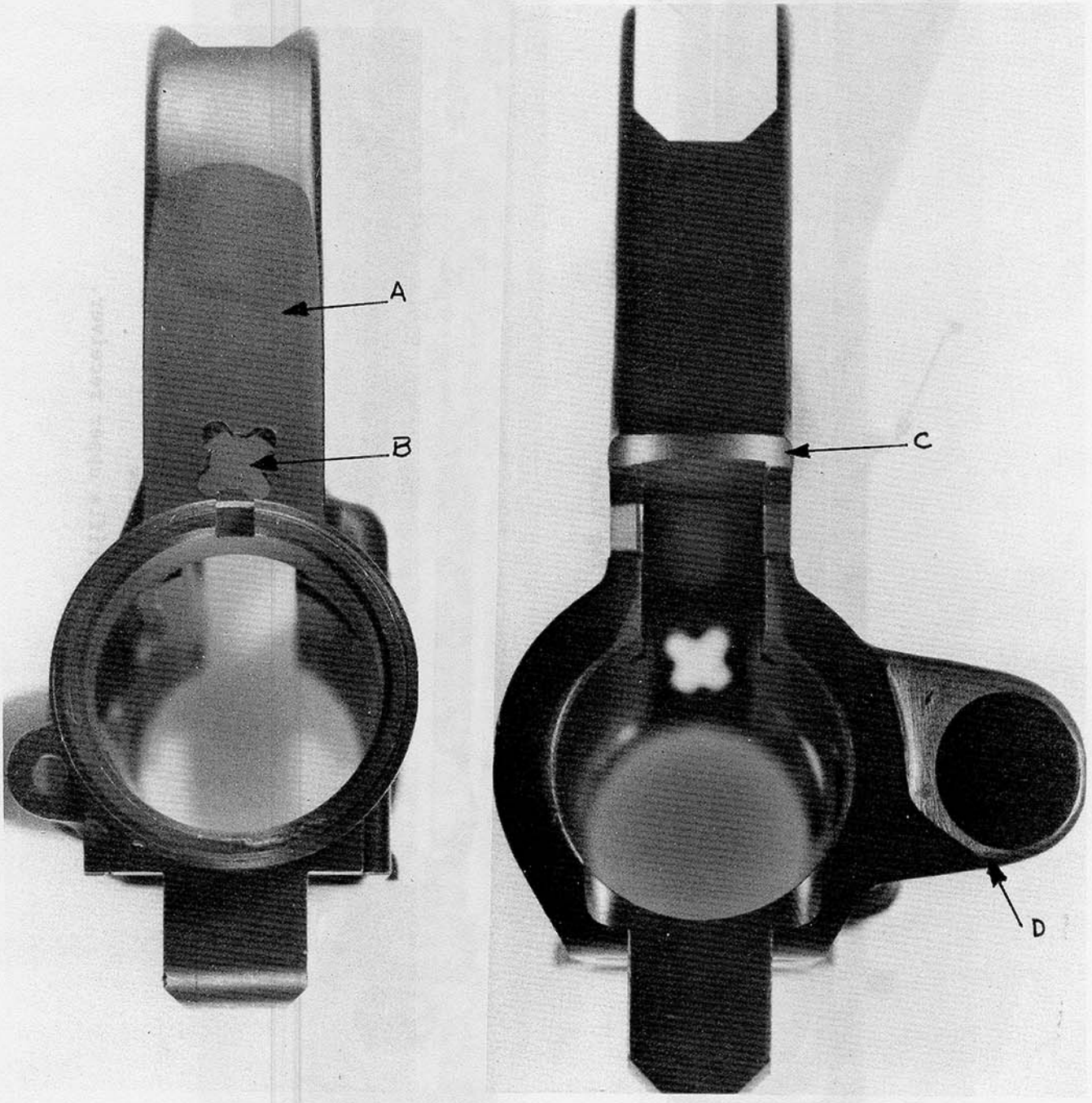
Figure 2-14. Test rifle upper receiver.



Front View

Rear View

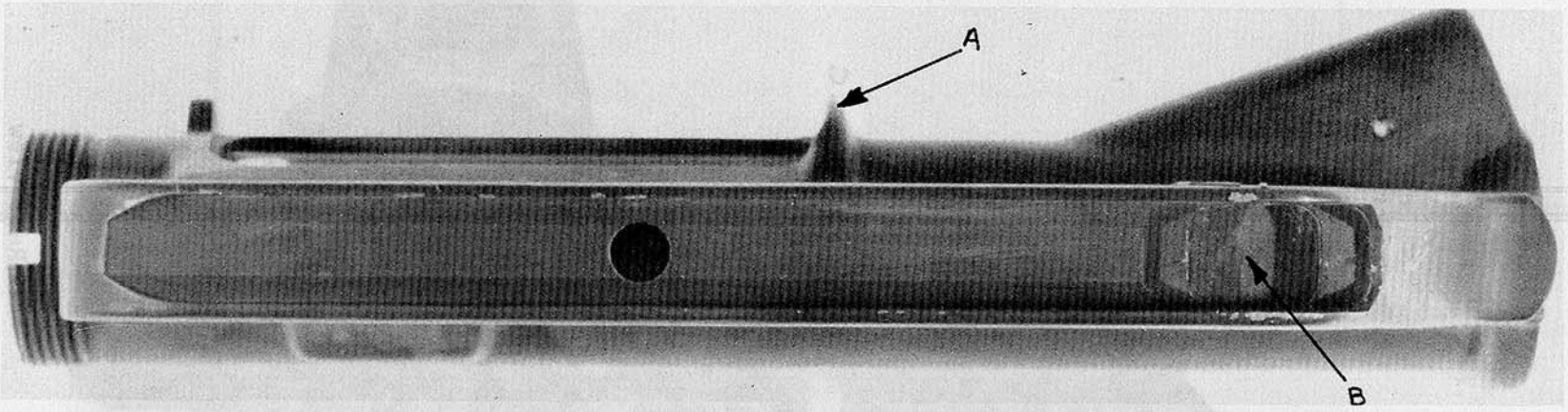
Figure 2-15. Upper receiver (US supply part - "CH" manufacturer mark).



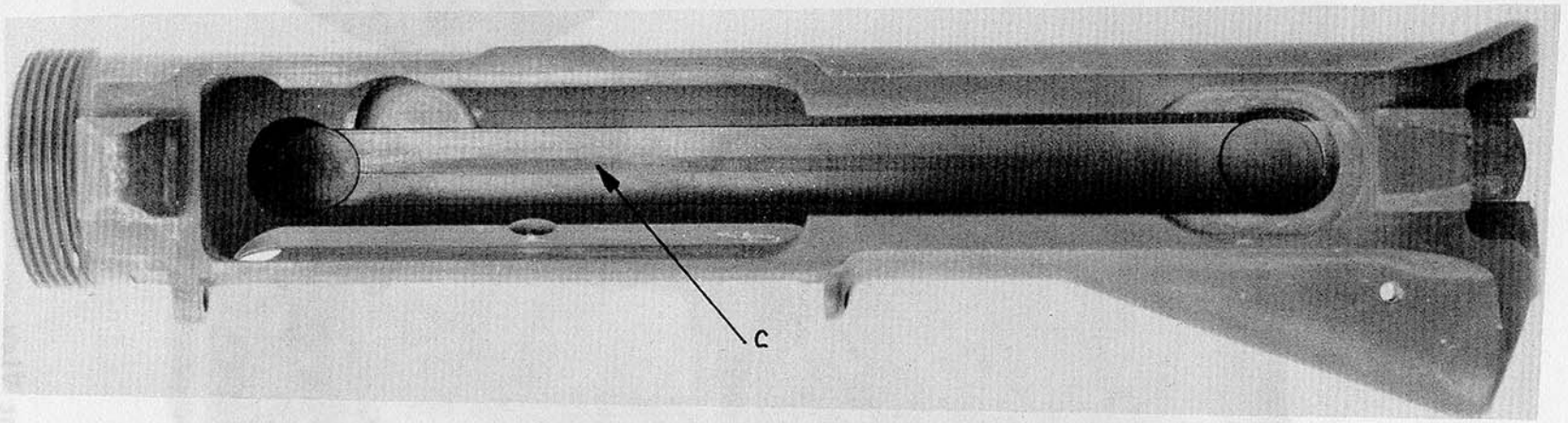
Front View

Rear View

Figure 2-16. Upper receiver (US supply part - "LM" manufacturer mark).

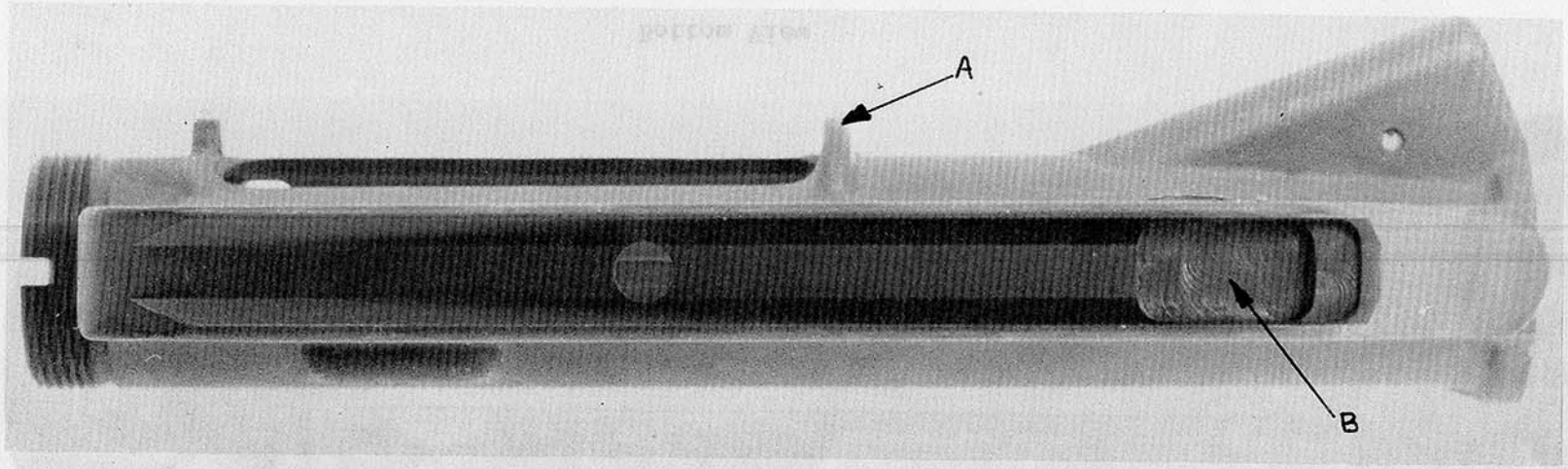


Top View

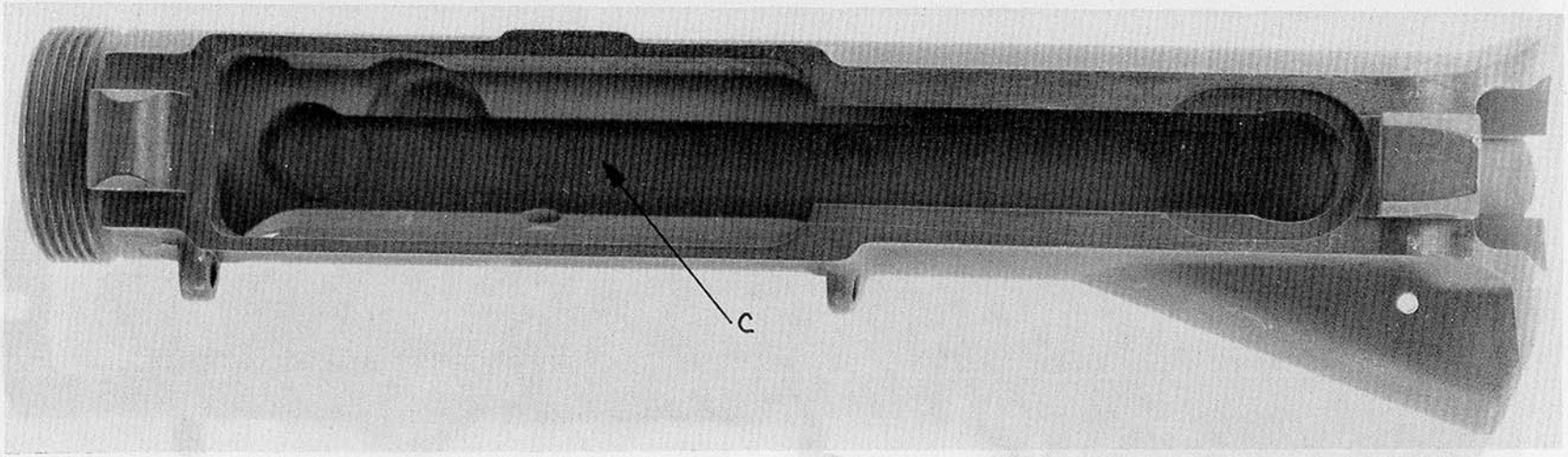


Bottom View

Figure 2-17. Test rifle upper receiver.

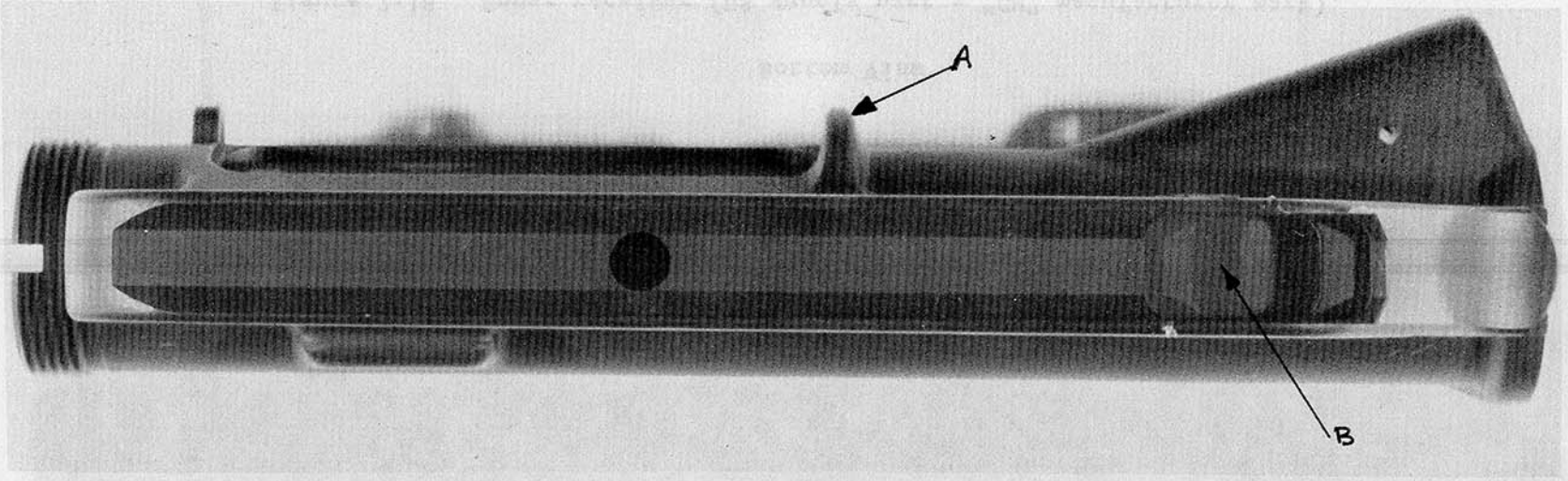


Top View

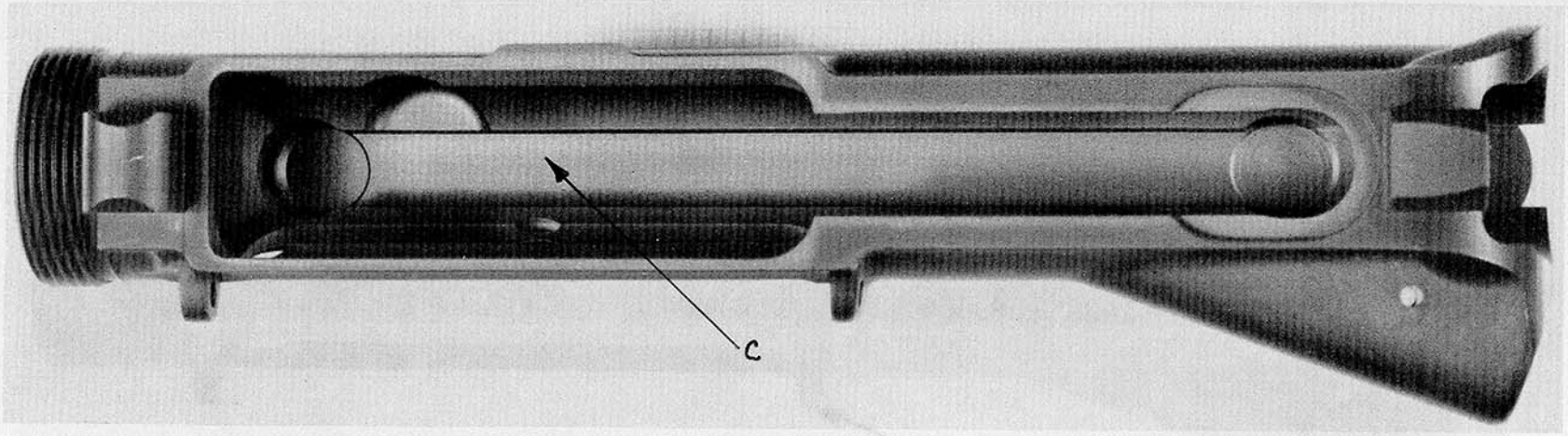


Bottom View

Figure 2-18. Upper receiver (US supply part - "CH" manufacturer mark).



Top View



Bottom View

Figure 2-19. Upper receiver (US supply part - "LM" manufacturer mark).

TABLE 2-4. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - BARREL ASSEMBLY

Figure No.	Description
2-20, 2-21	Comparison of markings on barrels, forward of the front sight. Current Colt barrel with chrome plated bore and chamber (A). Test rifle barrel with chrome plated chamber only is unmarked. US made spare barrel from supply has marking indicating chrome plated chamber only (B).
2-22, 2-23	Comparison of flash plating height on the barrel face (A1) and locking lugs of the barrel extension (A2). Both the test and 1968 vintage barrel from US supply had uninterrupted plating from the barrel face to the inner edges of the locking lugs. The plating on current M16A1 rifle barrels stops at the chamber mouth.

Note: The letters in ( ) refer to the arrow indicators on the figures.

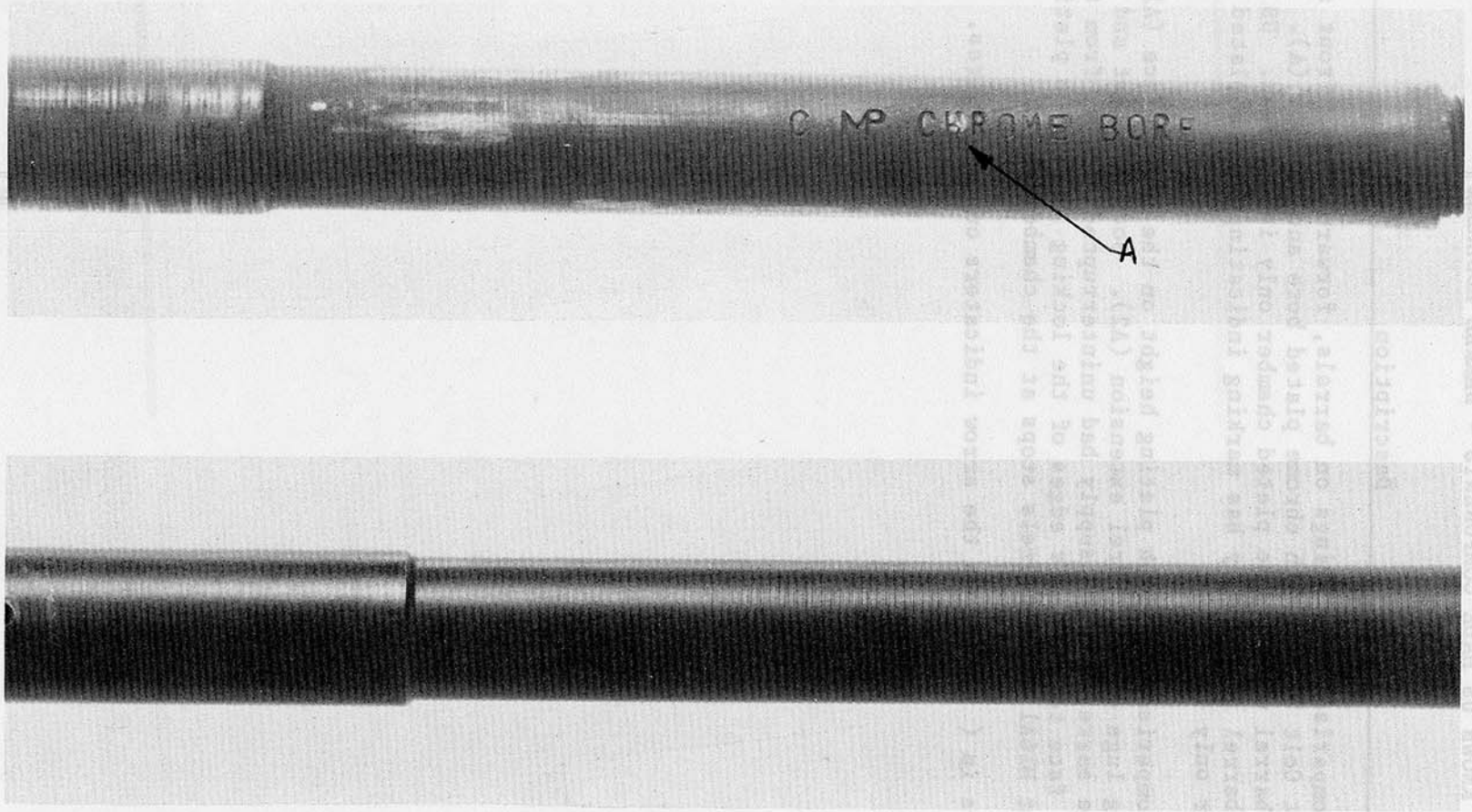


Figure 2-20. Top view of barrels. (Upper - from Colt produced M16A1 rifle SN 6418244 lower - test rifle, no markings.)

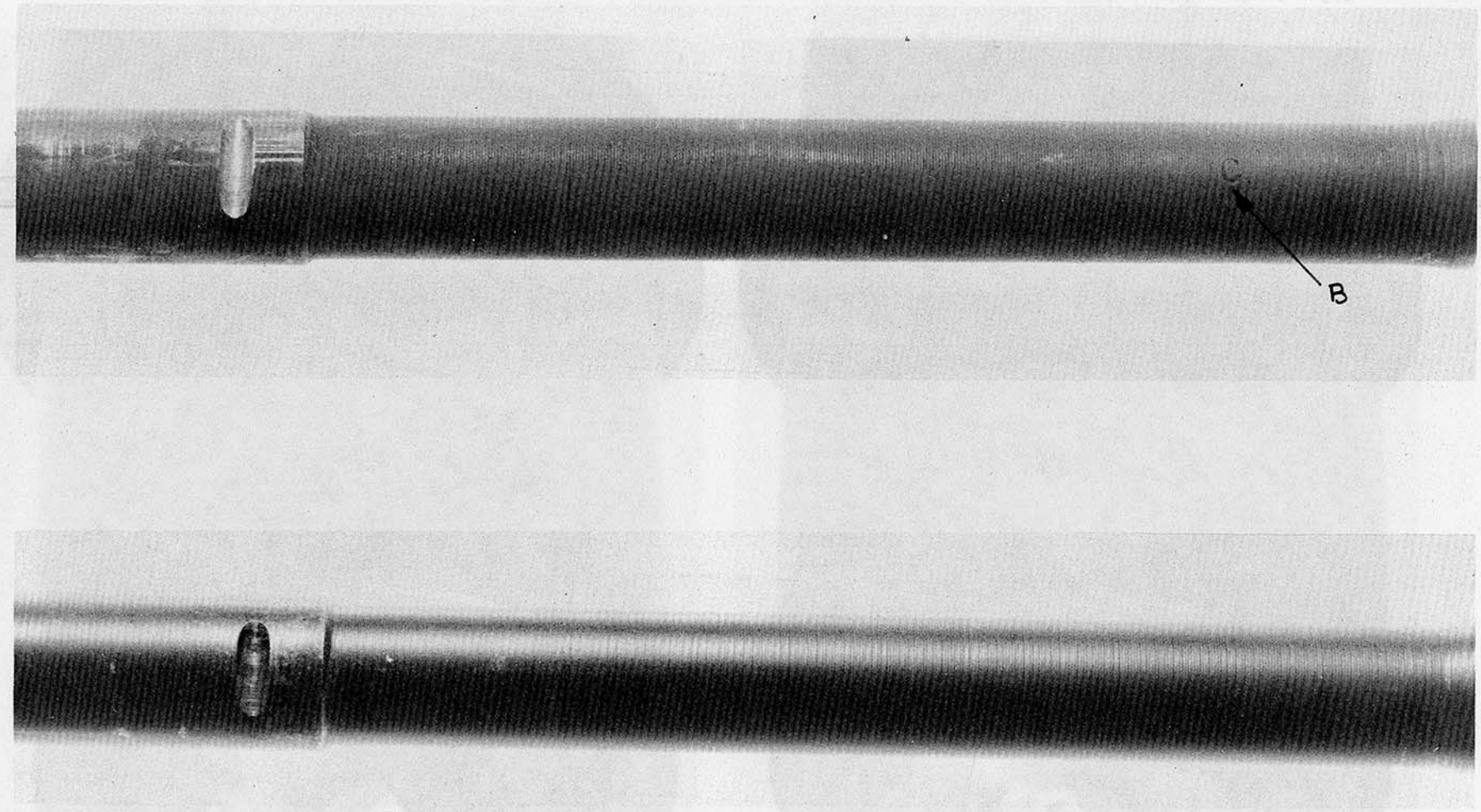


Figure 2-21. Bottom view of barrels. (Upper - US supply part, NSN 1005-00-878-6589, Contract No. DAAF03-66-C-0028 (5/68). Lower - test rifle, no markings.)

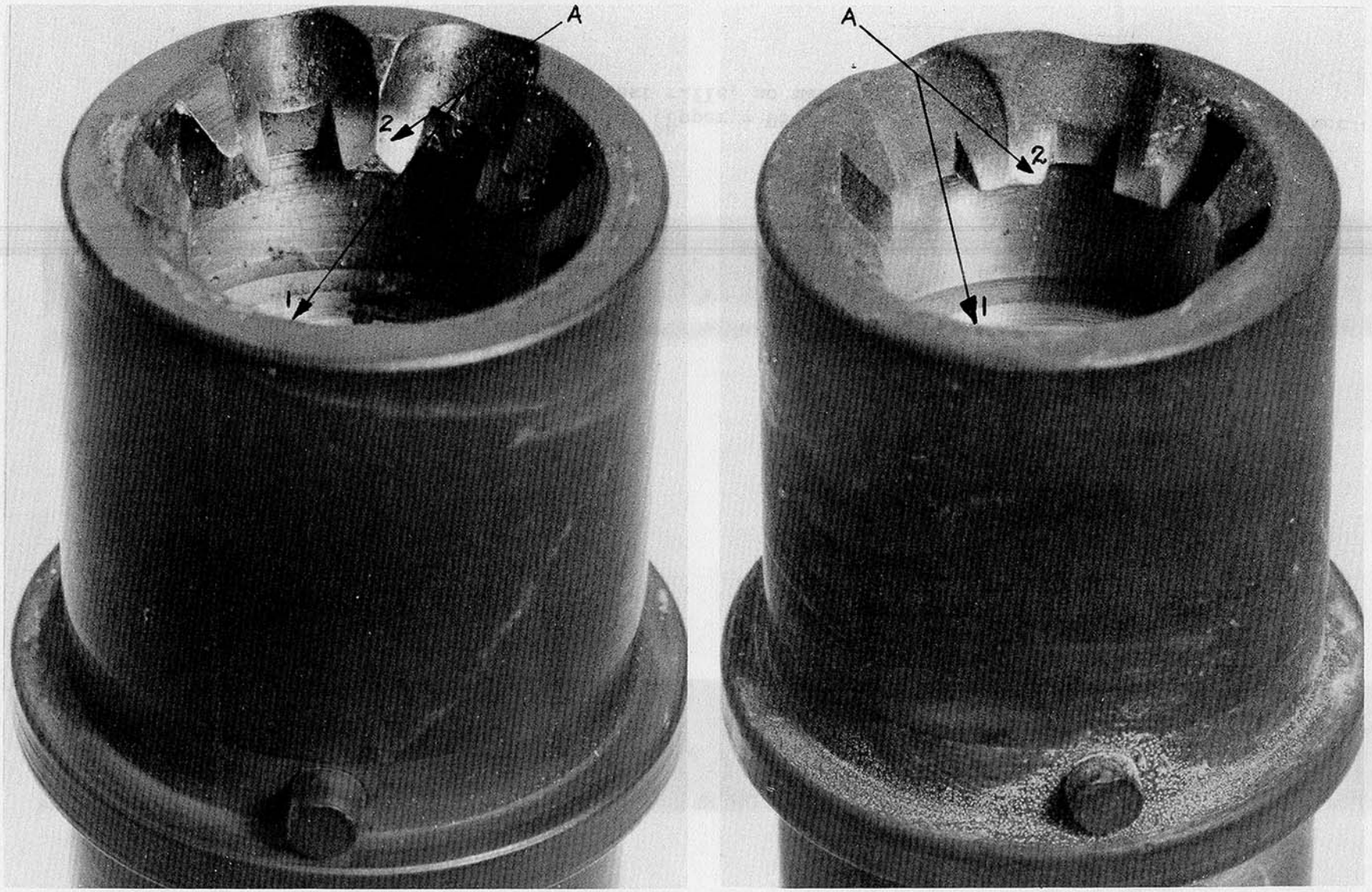


Figure 2-22. Barrel extension of test rifle (left) and US made spare part (right). Both with chrome plated chamber only.

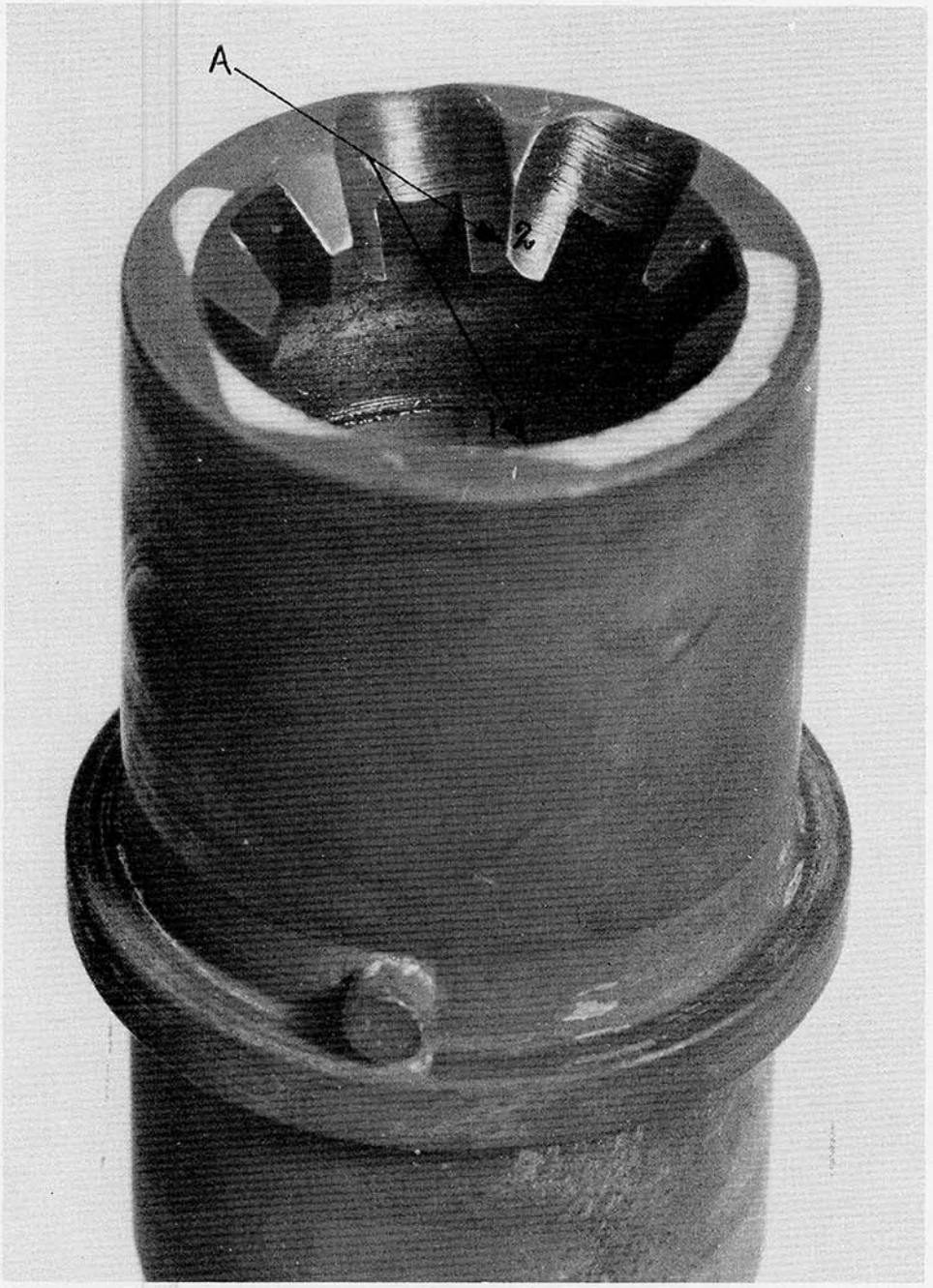


Figure 2-23. Barrel extension of Colt produced M16A1 rifle SN 6418244. Barrel has chrome plated bore and chamber.

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TABLE 2-5. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FRONT SIGHT

Figure No.	Description
2-24	Normal location of die marks which show signs of grinding off, underneath the finish (A). The sling swivel is retained by a rivet (B).
2-25a 2-25b	Letter C on front sight post housing (A). The sling swivel is retained by a rivet (B).
2-26	The No. 2 on forward end of gas tube housing (A). The sling swivel is retained by a spring pin.
2-27	The No. 6 on forward end of gas tube housing (A). The sling swivel is retained by a spring pin.
2-28	The letter C on front sight post housing and a Bell is on the forward end of gas tube housing (A). The sling swivel is retained by a spring pin.
2-29	No markings on either the front sight post or gas tube housings. There are no signs of marking removal (A). The sling swivel is retained by a spring pin (B).

Notes: The bayonet lug (C) of all sights show slight variations in shape and machining cuts, but function in the same manner.
The letters in ( ) refer to the arrow indicators on the figures.

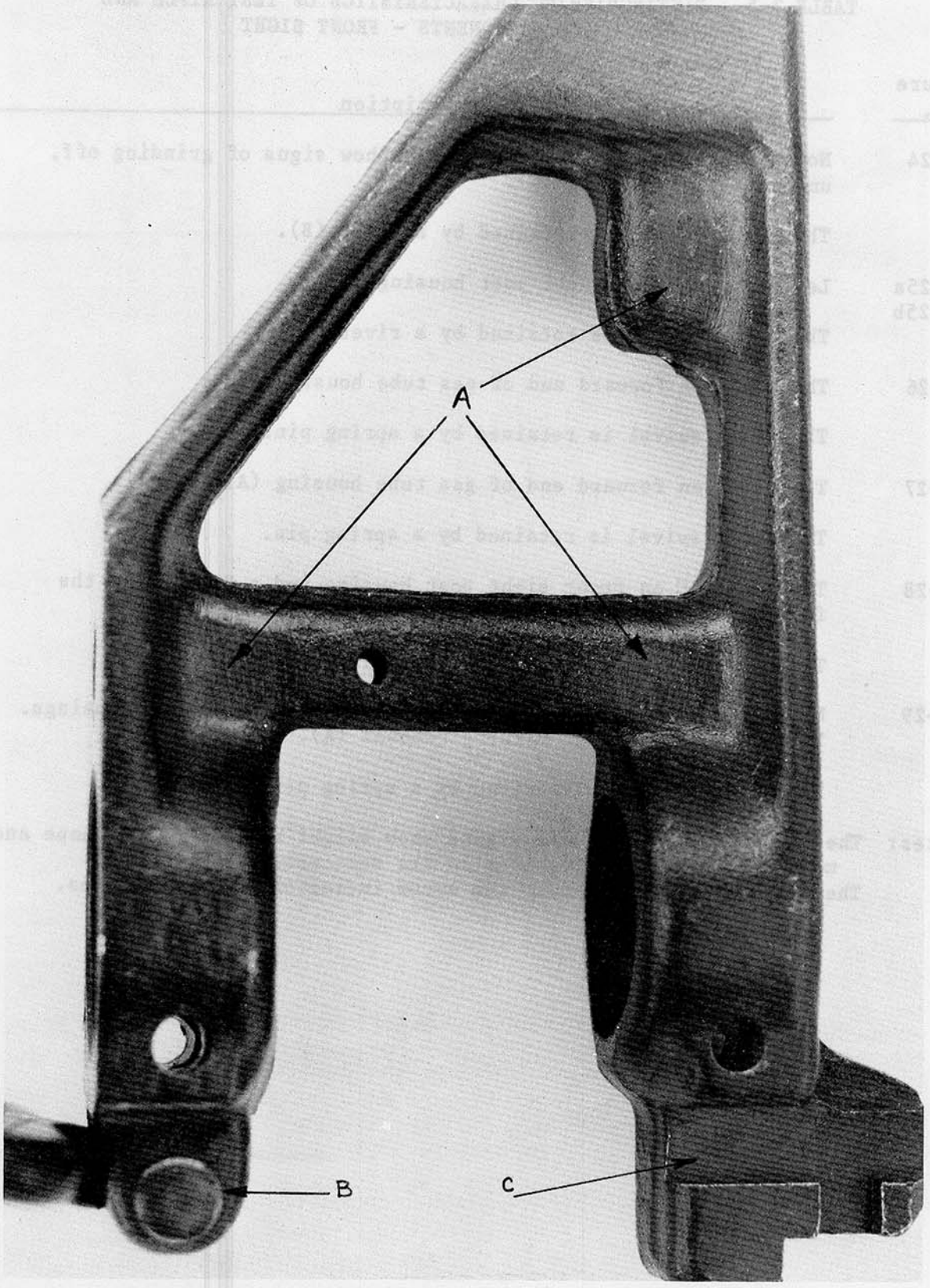

Figure 2-24. Test rifle right side view of front sight.

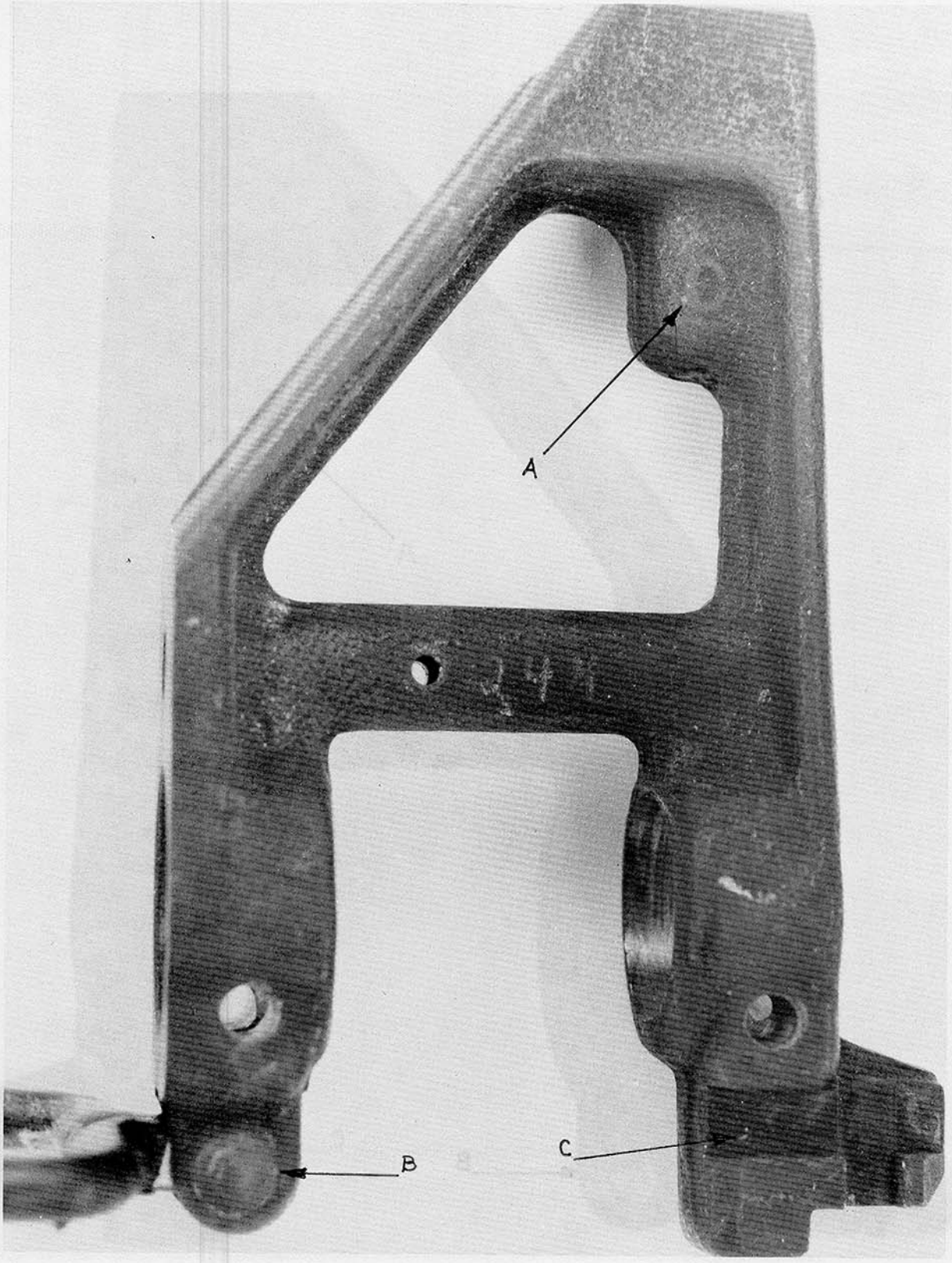

Figure 2-25a. Right side view of front sight from Colt produced M16A1 rifle SN 6418244.

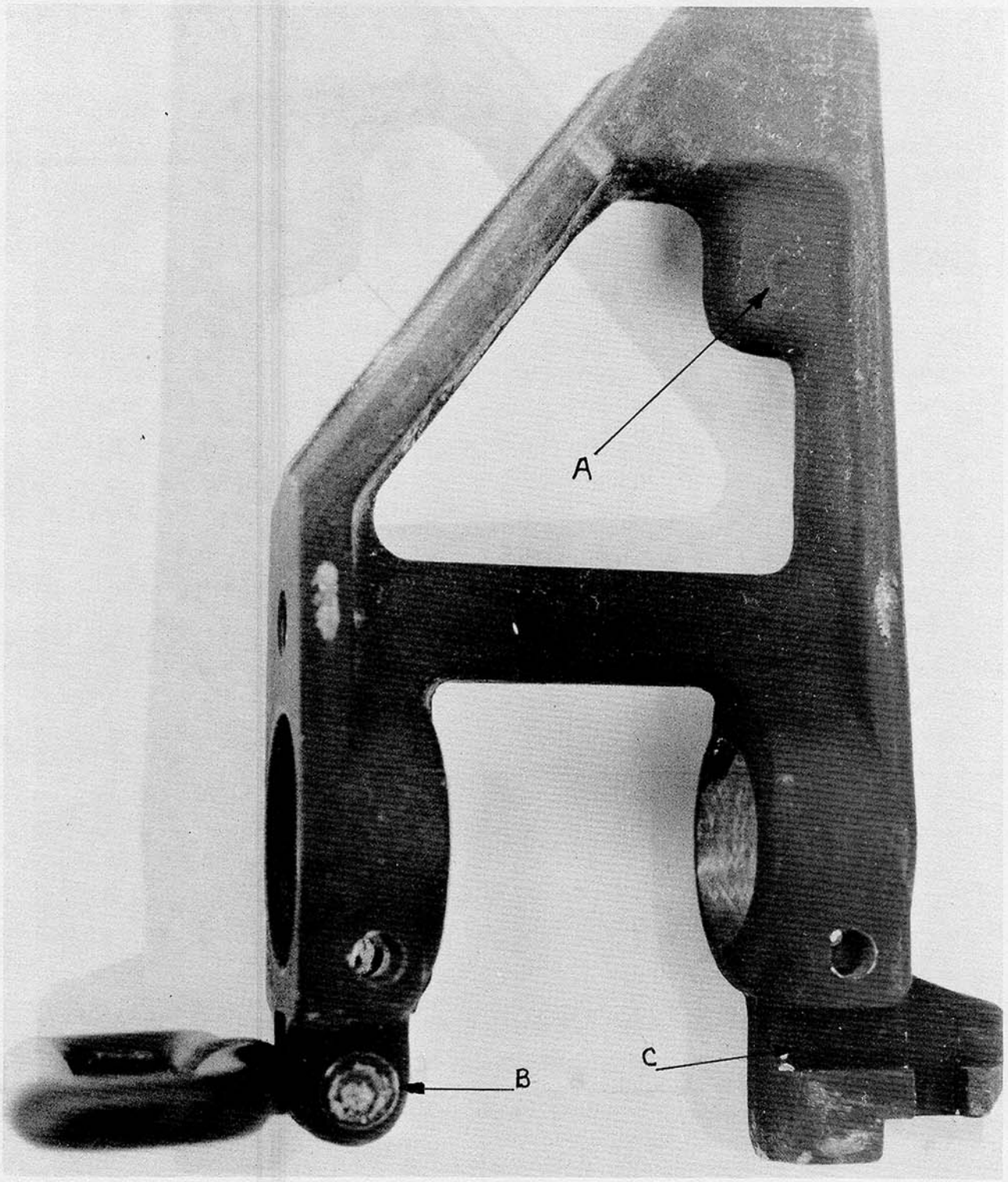

Figure 2-25b. Right side view of M16A1 rifle front sight from US supply.

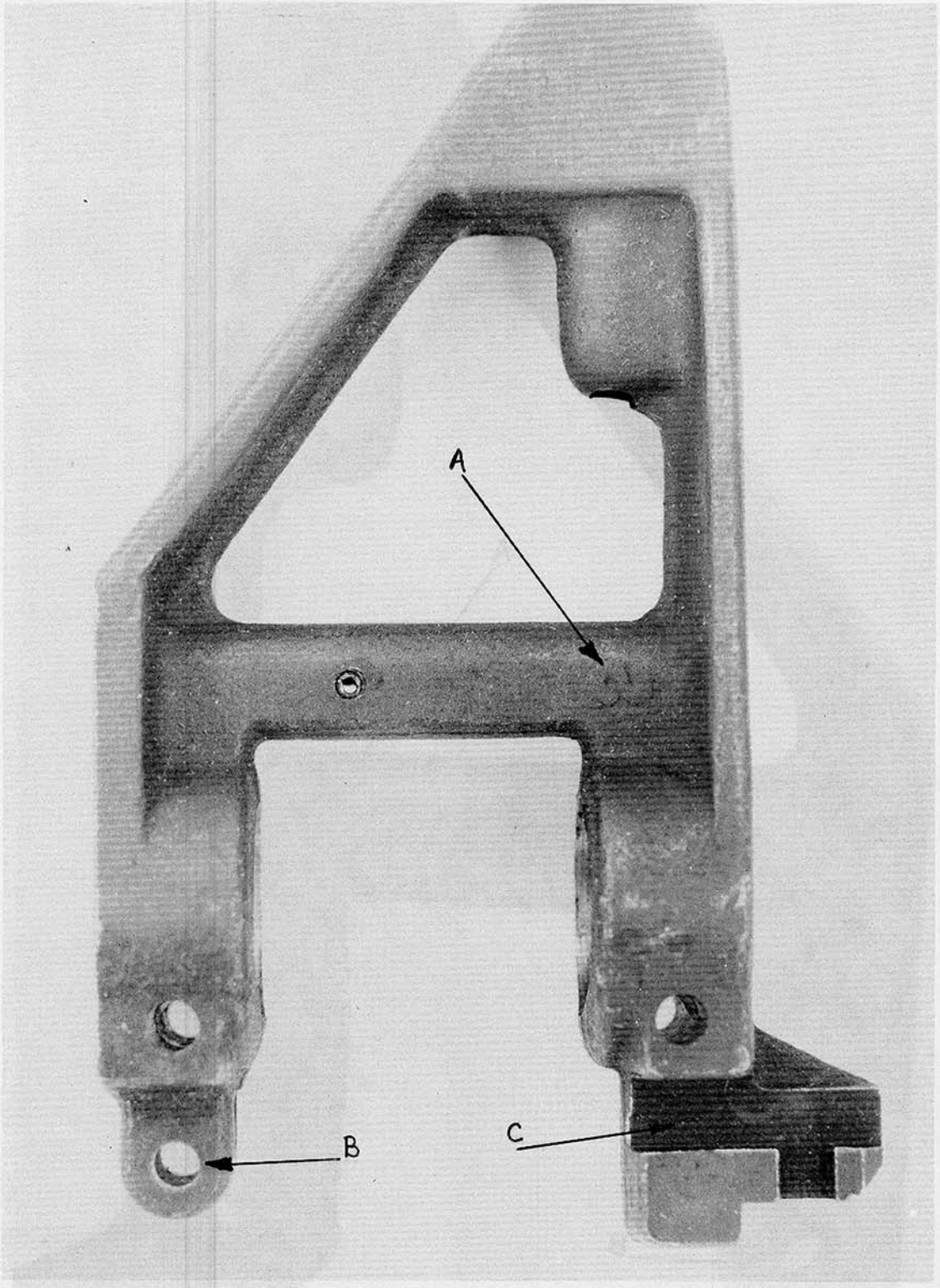

Figure 2-26. Right side view of M16A1 rifle front sight from US supply.

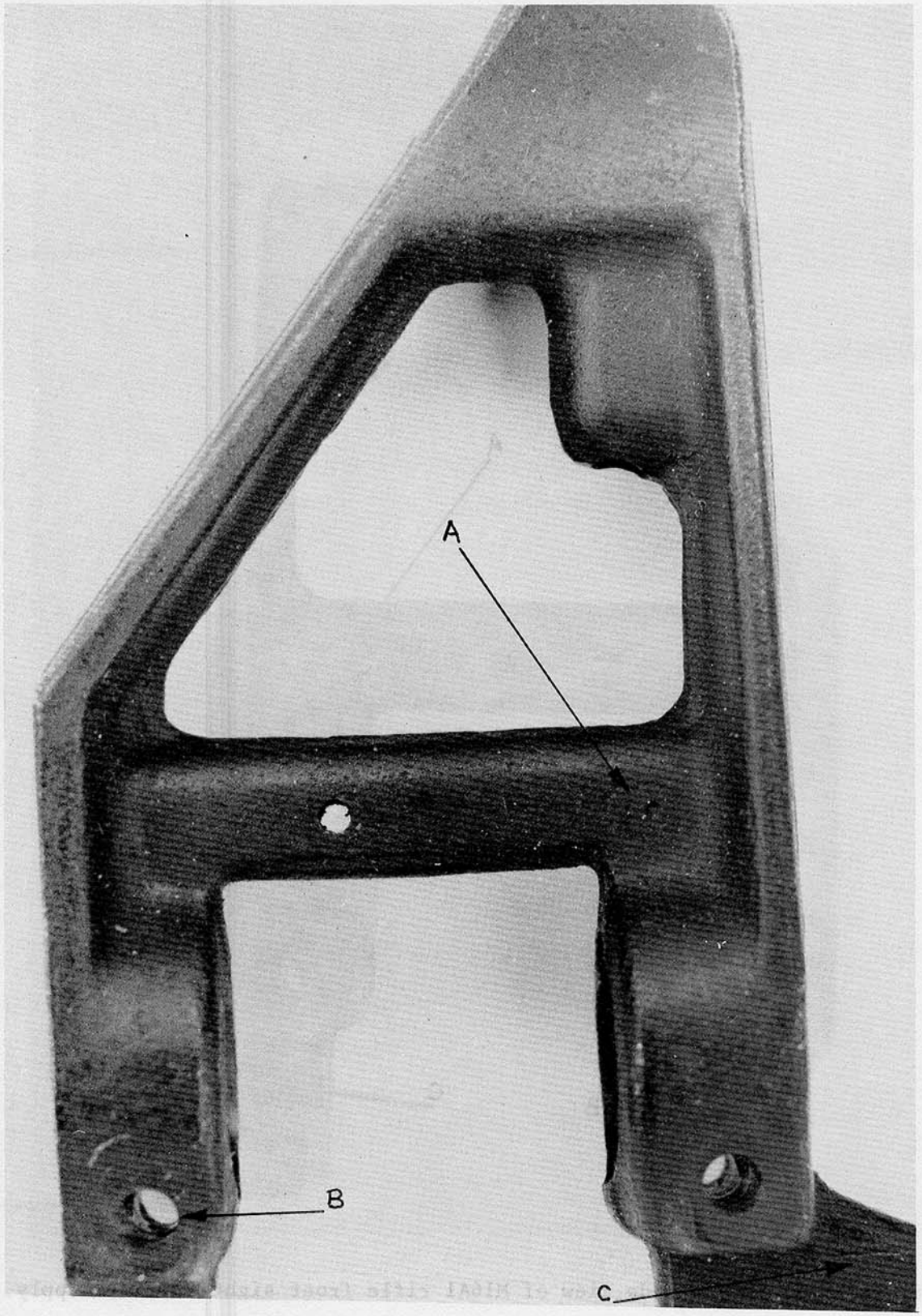

Figure 2-27. Right side view of M16A1 rifle front sight from US supply.

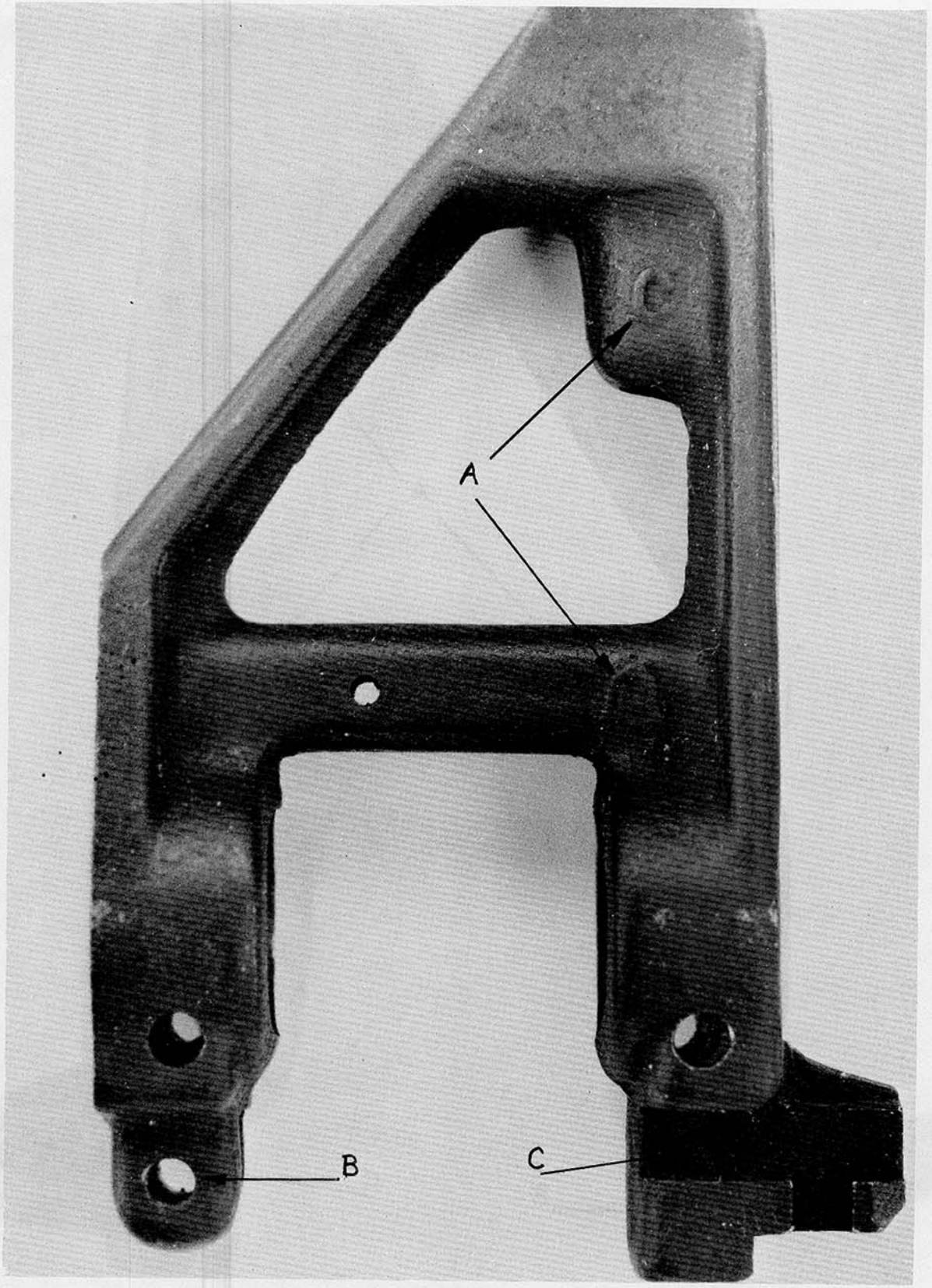

Figure 2-28. Right side view of M16A1 rifle front sight from US supply.

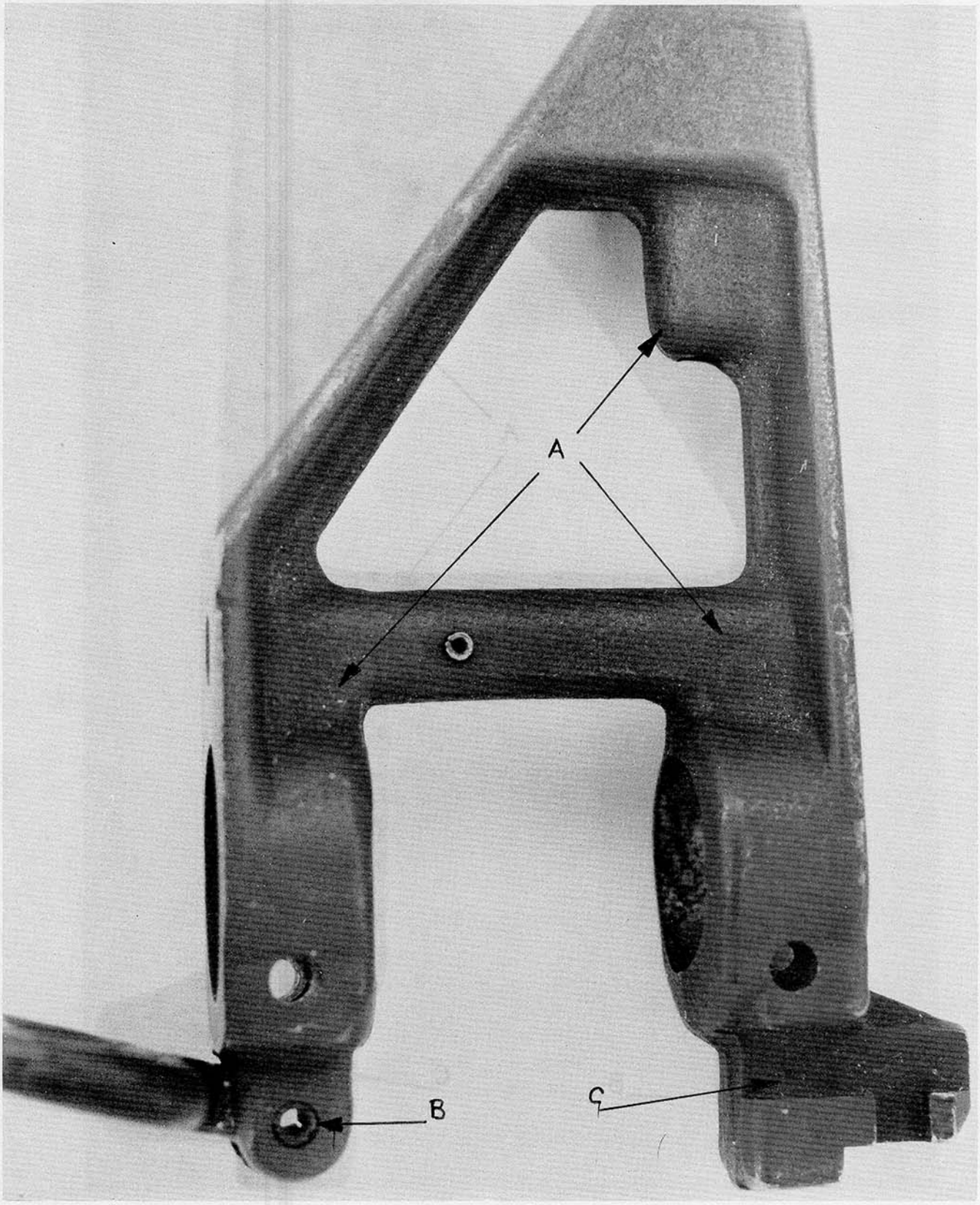

Figure 2-29. Right side view of M16A1 rifle front sight from US supply.

TABLE 2-6. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FRONT SIGHT

Figure No.	Description
2-30	Wide irregular sight ramp surface profile (A). Circular turning marks on rear face of sight body (B). Convoluted contour of sling swivel lugs at junction with the body (C). Wide irregular surface at front of sight (D). Truncated bayonet lug profile at top (E).
2-31	Narrow irregular sight ramp surface profile (A). Smooth circular turning marks on rear face of sight body (B). Single curved contour of sling swivel lugs at junction with body (C). Narrow irregular surface at front of sight (D). Irregular bayonet lug profile at top (E).
2-32	Narrow irregular sight ramp surface profile (A). Smooth, flat machined surface on rear face of sight body (B). Convoluted contour of sling swivel lugs at junction with body (C). Narrow irregular surface at front of sight (D). Basically straight bayonet lug profile at top (E).
2-33	Narrow irregular sight ramp surface profile (A). Smooth circular turning marks on rear face of sight body (B). Single curved contour of sling swivel lugs at junction with body (C). Narrow irregular surface at front of sight (D). Basically straight bayonet lug profile at top (E).
2-34	Medium wide irregular sight ramp surface profile (A). Circular turning marks on rear face of front sight body (B). Convoluted contour of sling swivel lugs at junction with body (C). Medium wide irregular surface at front of sight (D). Basically smooth curve of bayonet lug profile at top (E).
2-35	Medium wide smoothly irregular sight ramp surface profile (A). Circular turning marks on rear face of sight body (B). Single curved contour of sling swivel lugs at junction with body (C). Medium wide irregular surface at front of sight (D). Irregular profile of bayonet lug at top (E).
2-36	Smooth sight ramp surface profile (A). Circular turning marks on rear face of sight body (B). Single curved contour of sling swivel lugs at junction with body (C). Smooth (ground) surface at front of sight (D). Irregular profile of bayonet lug at top (E).
2-37	Smooth sight ramp surface profile (A). Smooth circular turning marks on rear face of sight body (B). Single curved contour of sling swivel lugs at junction with body (C). Smooth (ground) surface at front of sight (D). Irregular profile of bayonet lug at top (E).

TABLE 2-6 (CONT'D)

Figure No.	Description
2-38	Smooth sight ramp surface profile (A). Smooth flat machined surface on rear face of sight body (B). Convoluted contour of sling swivel lugs at junction with body (C). Smooth (ground) surface at front of sight (D). Irregular profile of bayonet lug at top (E).
2-39	Smooth sight ramp surface profile (A). Smooth flat machined surface on rear face of sight body (B). Convoluted contour of sling swivel lugs at junction with body (C). Smooth (ground) surface at front of sight (D). Irregular profile of bayonet lug at top (E).
2-40	Smooth sight ramp surface profile (A). Smooth flat machined surface on rear face of sight body (B). Convoluted contour of sling swivel lugs at junction with body (C). Smooth (ground) surface at front of sight (D). Irregular profile of bayonet lug at top (E).

Note: The letters in ( ) refer to the arrow indicators on the figures.

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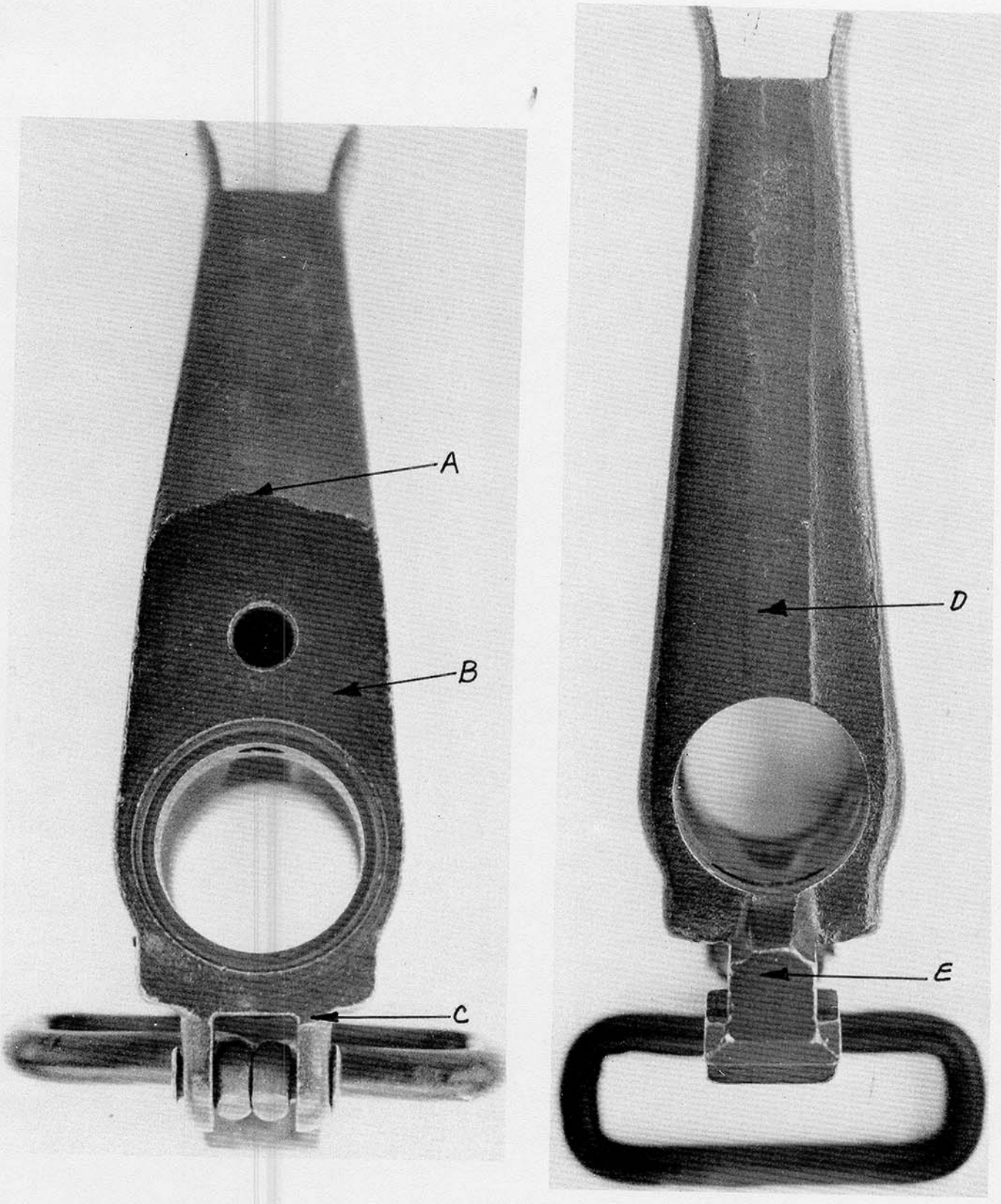
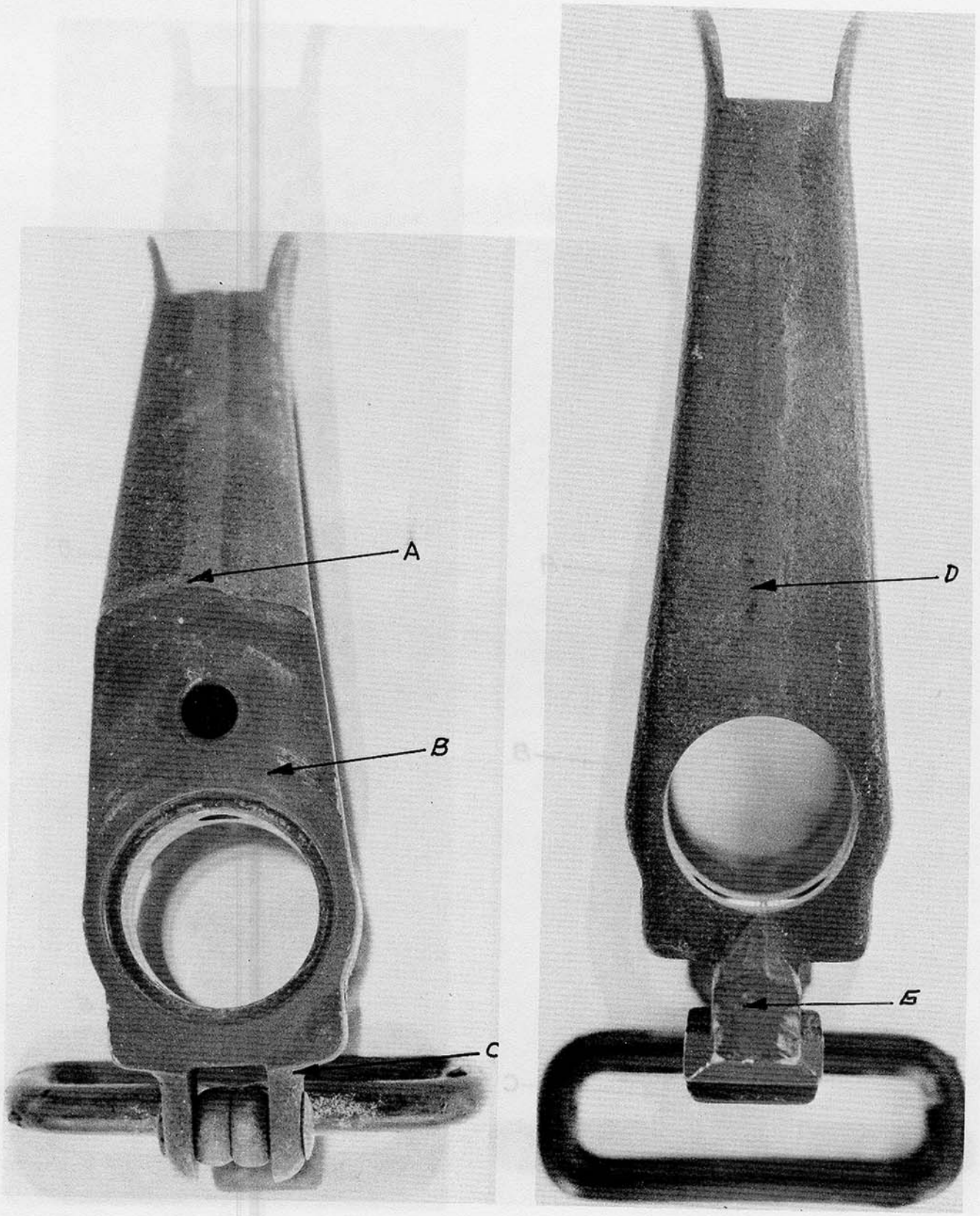


Rear View

Front View

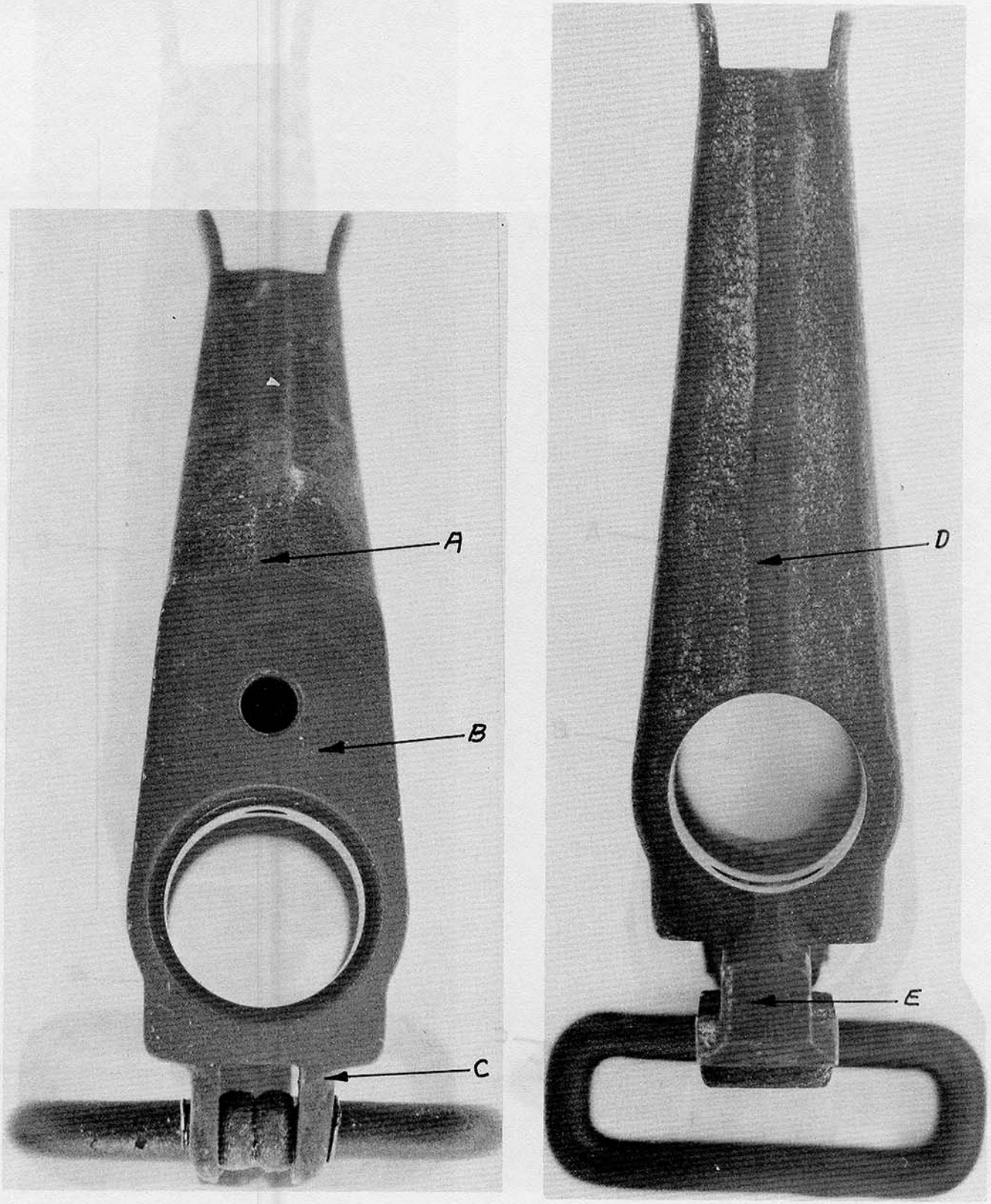
Figure 2-30. Test rifle front sight.



Rear View

Front View

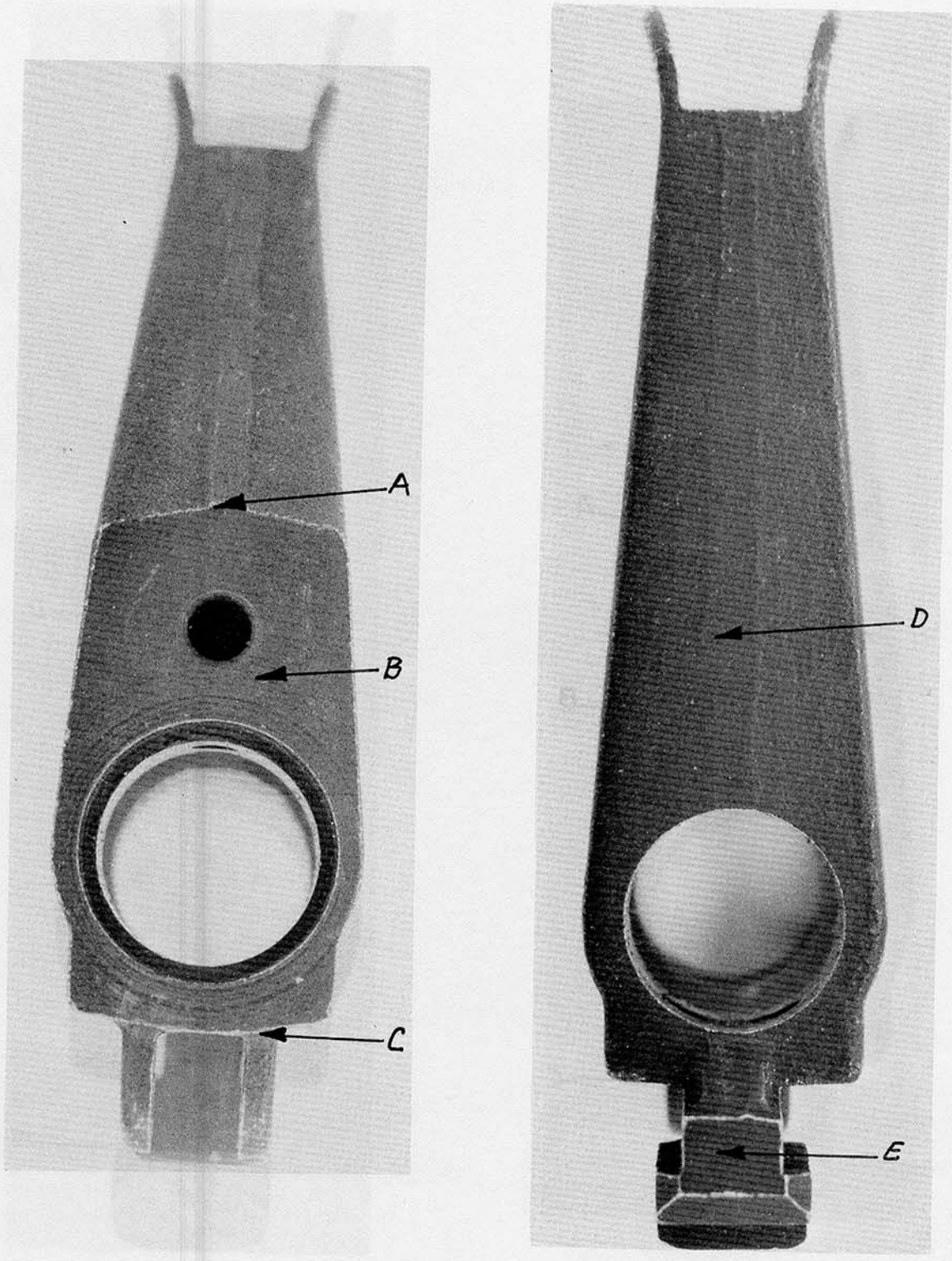
Figure 2-31. Front sight from Colt produced M16A1 rifle SN 6418244.



Rear View

Front View

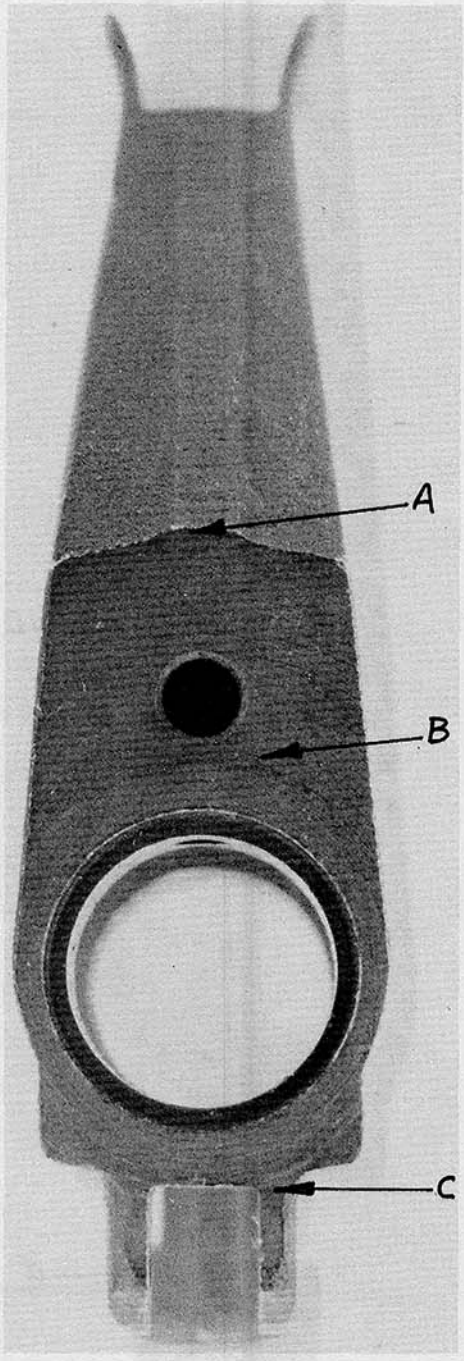
Figure 2-32. M16A1 rifle front sight from US supply (ref fig. 2-25).



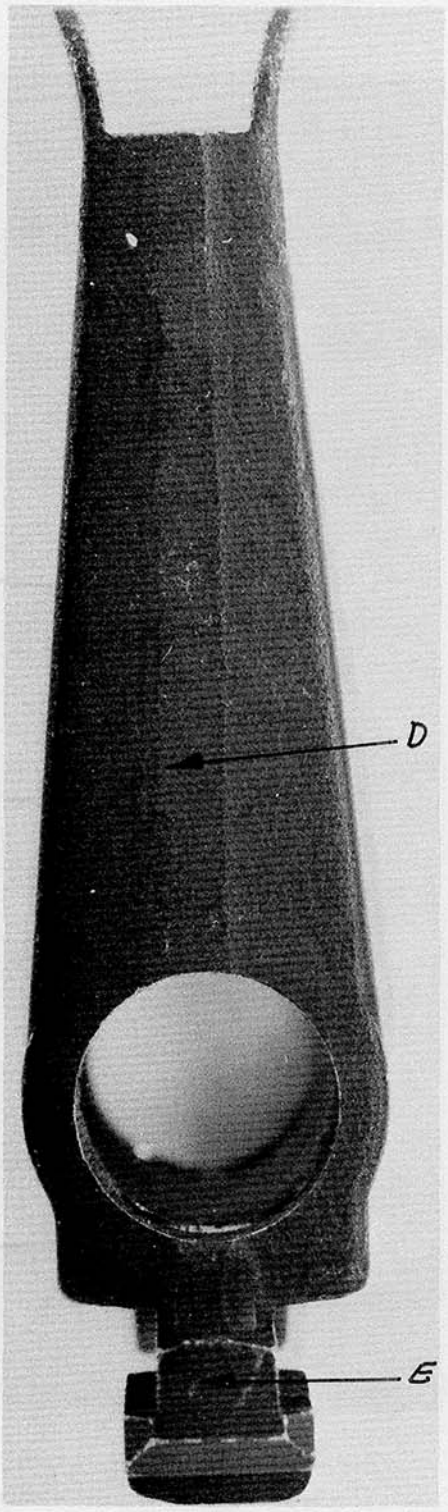
Rear View

Front View

Figure 2-33. M16A1 rifle front sight from US supply (ref fig. 2-26).

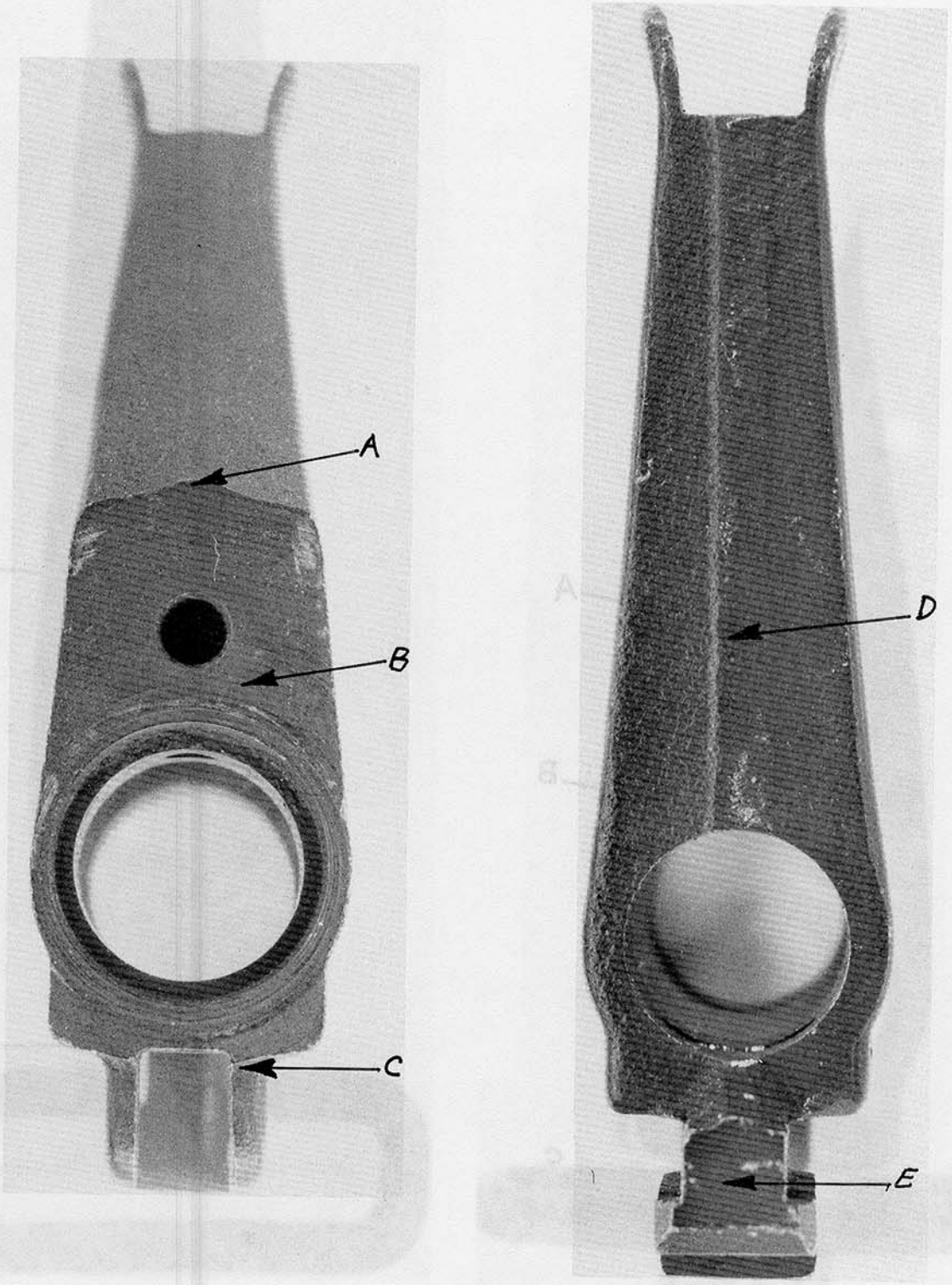


Rear View



Front View

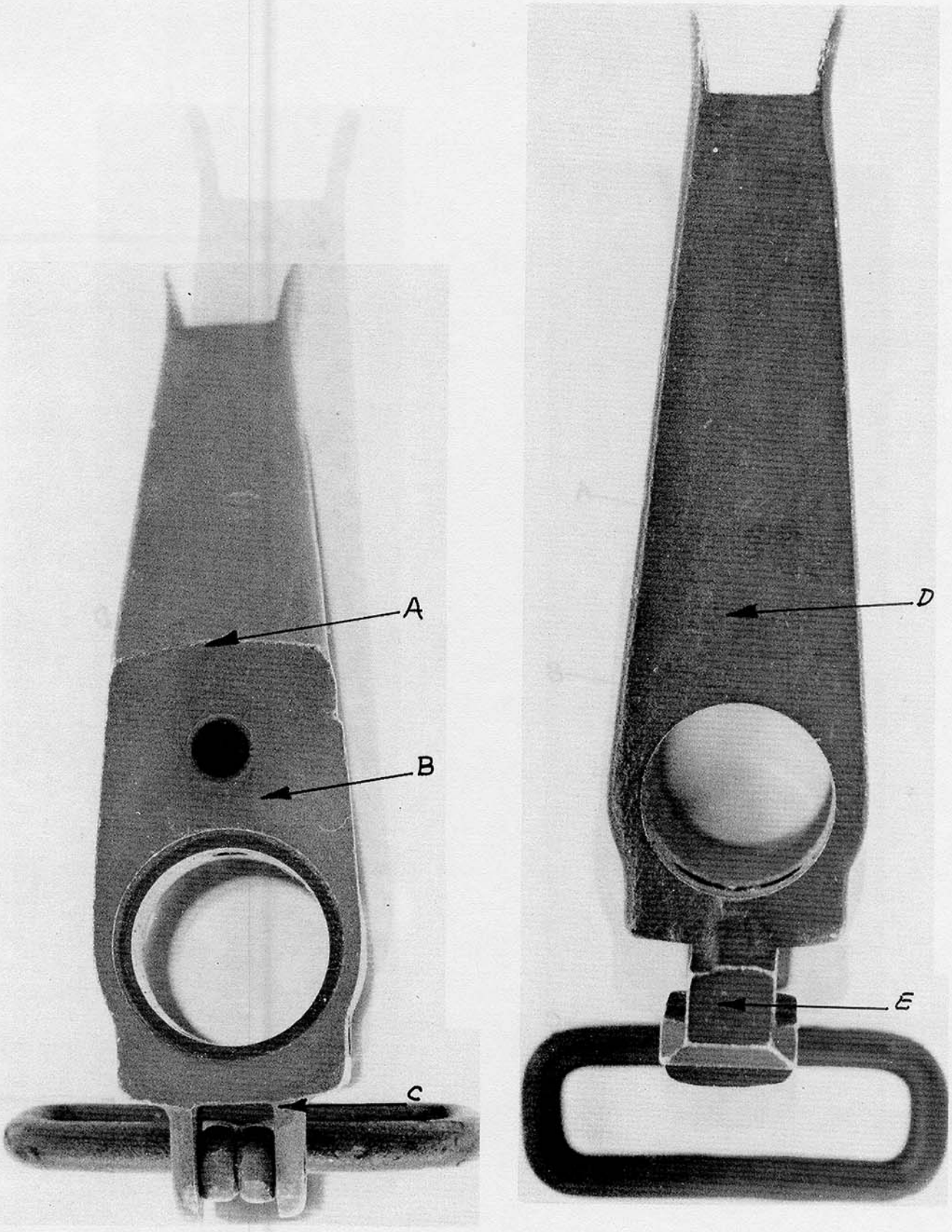
Figure 2-34. M16A1 rifle front sight from US supply (ref fig. 2-27).



Rear View

Front View

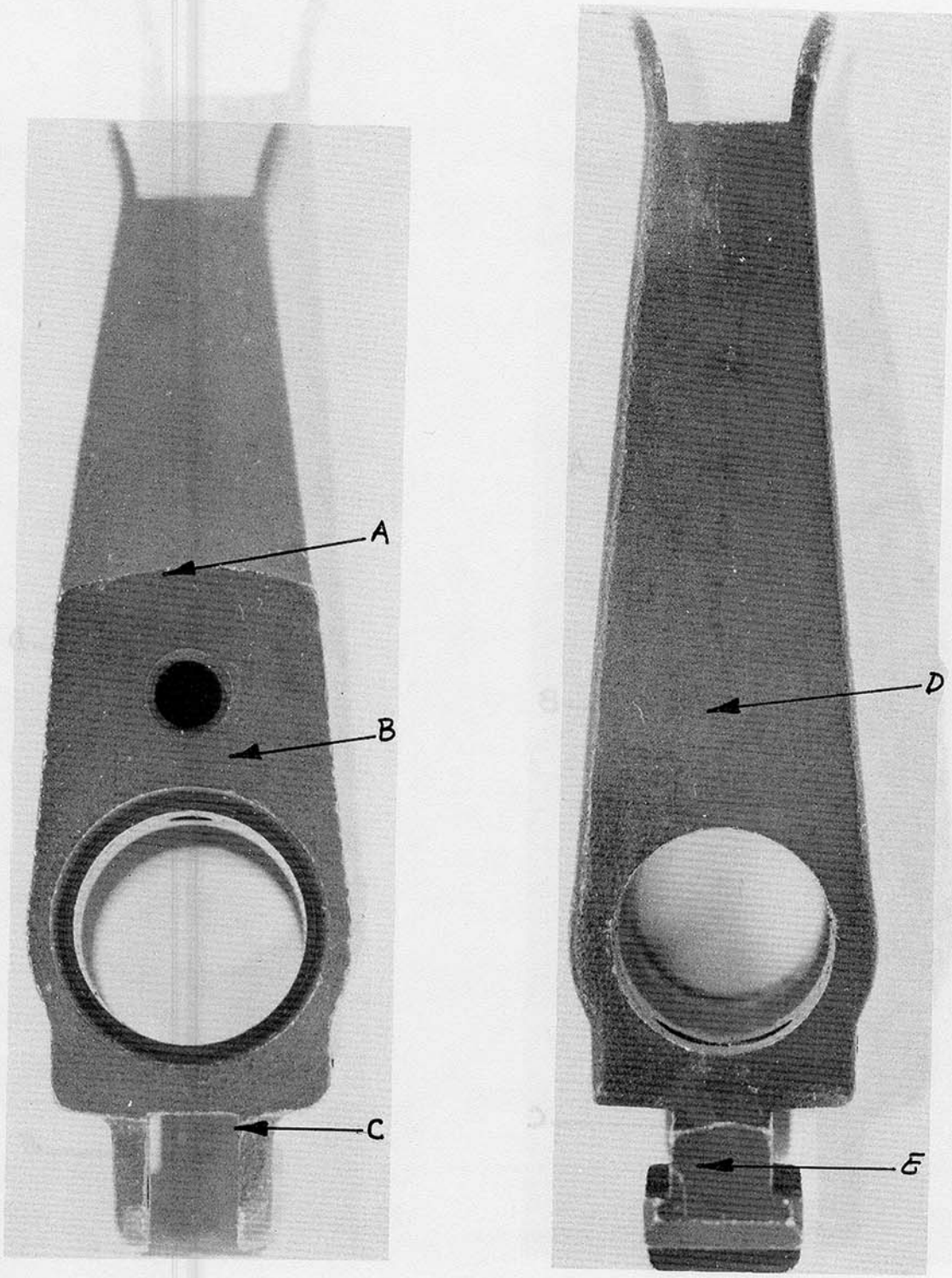
Figure 2-35. M16A1 rifle front sight from US supply (ref fig. 2-28).



Rear View

Front View

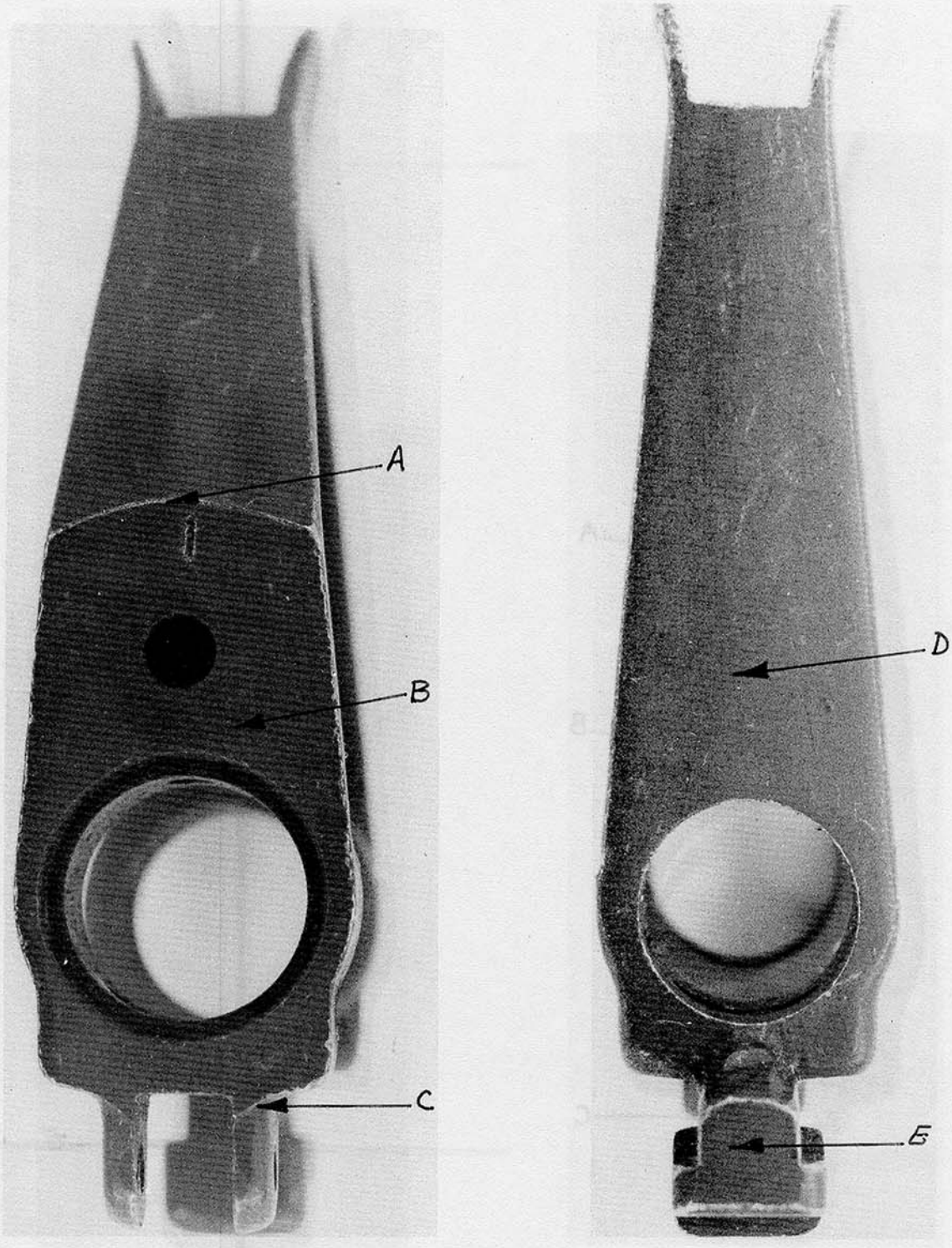
Figure 2-36. M16A1 rifle front sight from US supply (ref fig. 2-29).



Rear View

Front View

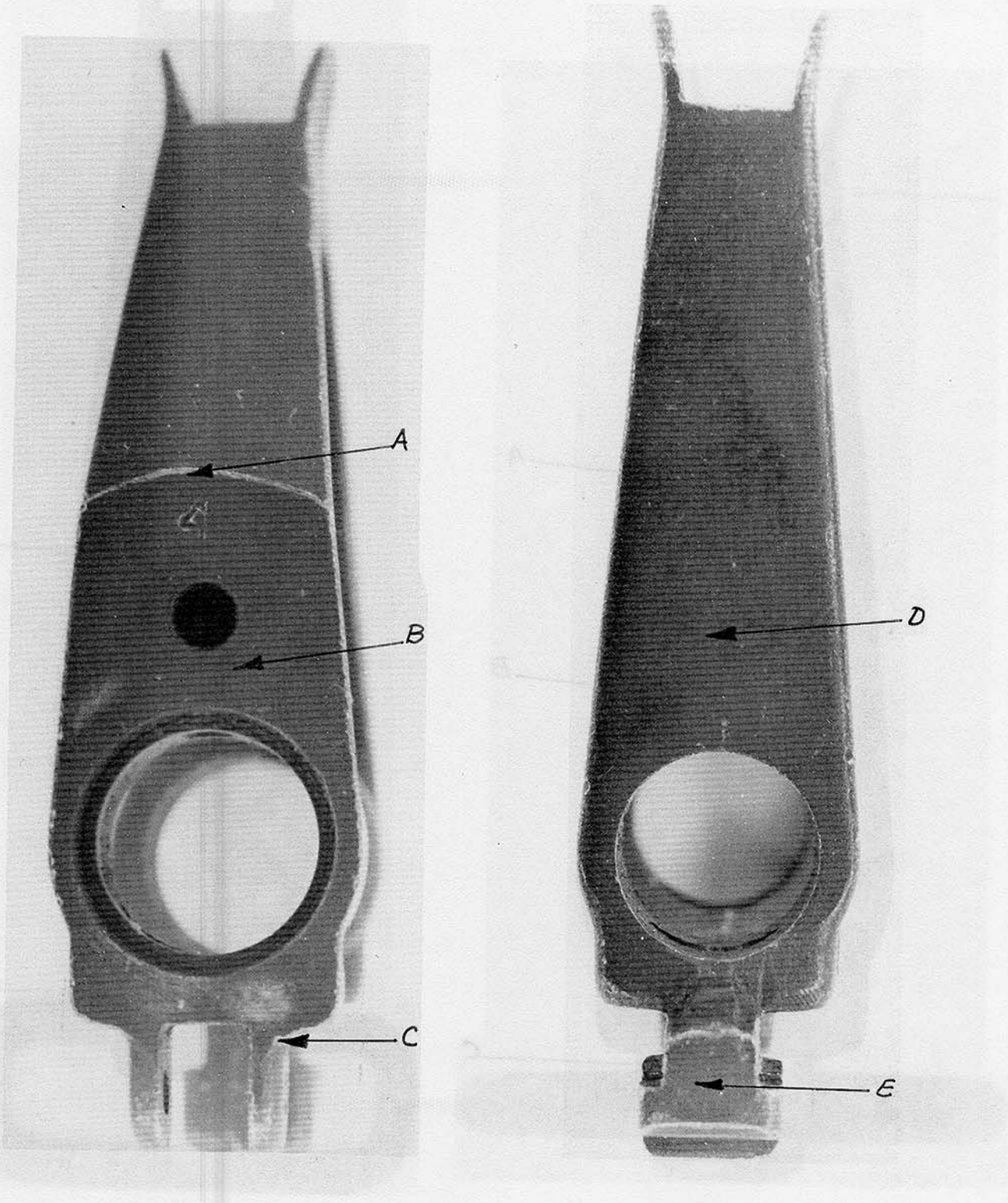
Figure 2-37. Early production (M16E1) rifle front sight from US supply.



Rear View

Front View

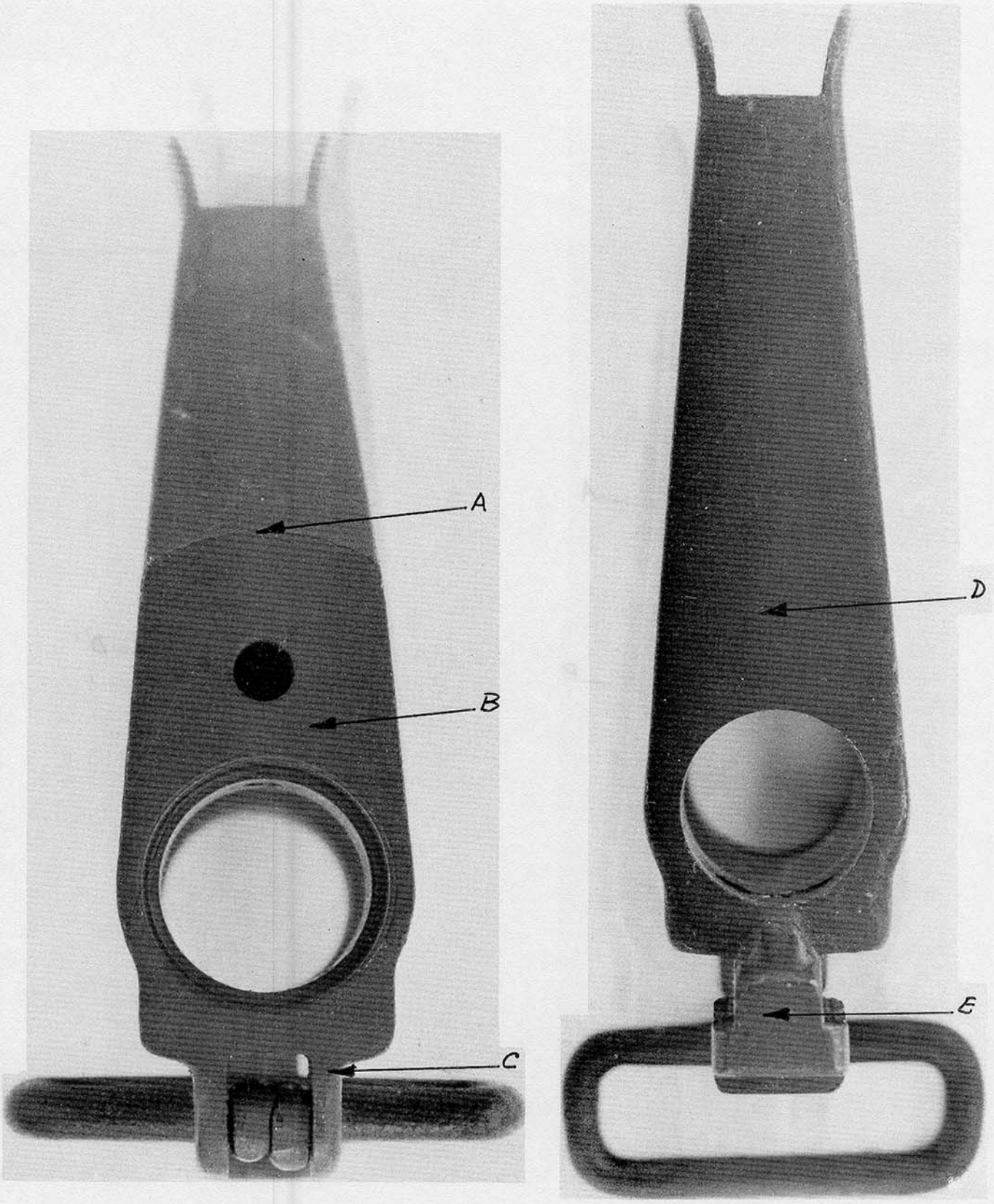
Figure 2-38. Early production (M16E1) rifle front sight from US supply.



Rear View

Front View

Figure 2-39. Early production (M16E1) rifle front sight from US supply.



Rear View

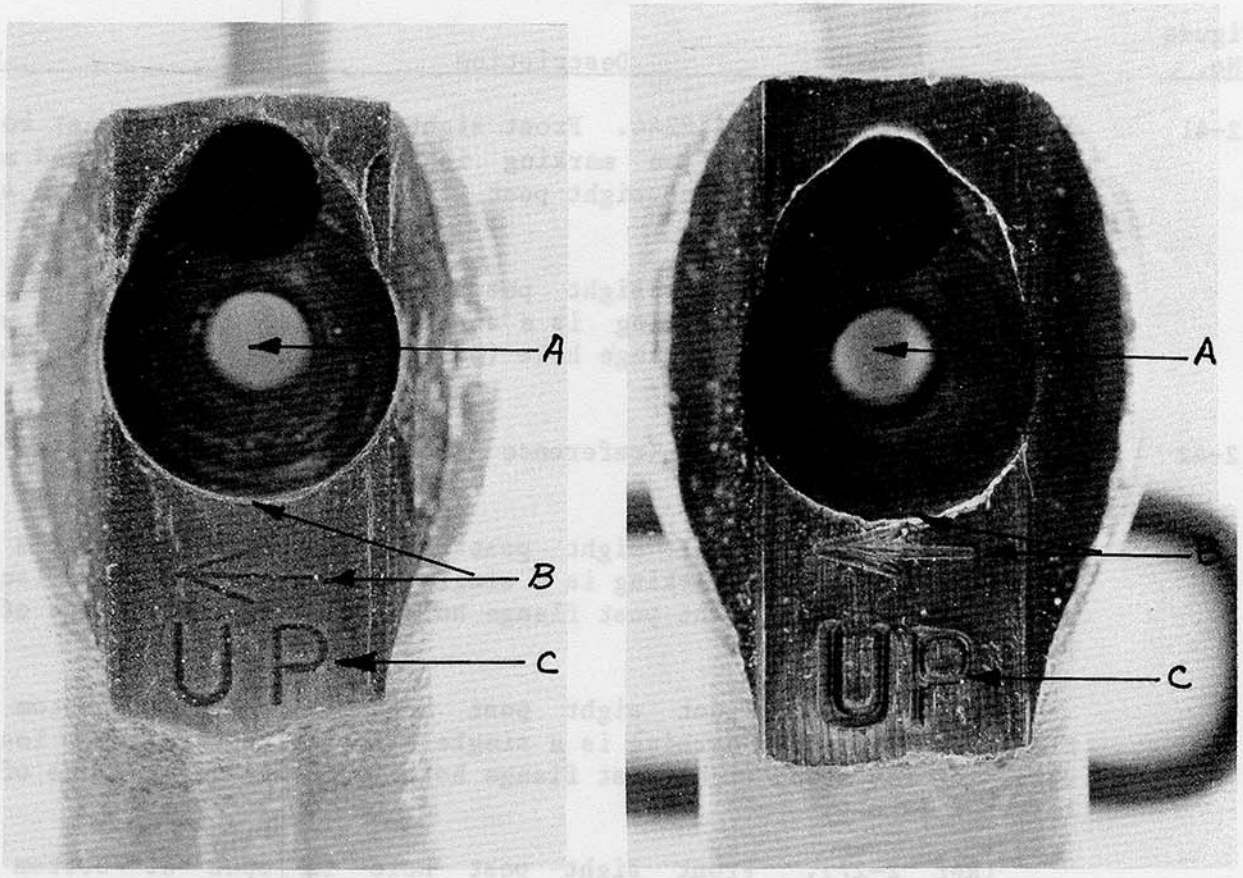
Front View

Figure 2-40. Early production (M16E1) rifle front sight from US supply.

TABLE 2-7. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FRONT SIGHT

Figure No.	Description
2-41	M16A1 Rifle SN 6418244. Front sight post hole is open at bottom (A). Elevation direction marking is a single line open head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	Test Rifle. Front sight post hole is open at bottom (A). Elevation direction marking is a single line open head arrow, which contacts the front post flange hole (B). The inner shape of the letter P is an O.
2-42	US supply parts: (reference figures apply to right side view photographs).
	(Ref 2-25). Front sight post hole is open at bottom (A). Elevation direction marking is a single line open head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref 2-26). Front sight post hole is open at bottom (A). Elevation direction marking is a single line solid head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref 2-27). Front sight post hole is open at bottom (A). Elevation direction marking is a single line solid head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref 2-28). Front sight post hole is open at bottom (A). Elevation direction marking is a single line open head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref 2-29). Front sight post hole is open at bottom (A). Elevation direction marking is a single line closed head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref none). Front sight post hole is open at bottom (A). Elevation direction marking is a single line open head arrow which contacts the front sight post flange hole (B). The inner shape of the letter P is a D.
	(Ref 2-38, 2-39, 2-40). Front sight post hole is closed at bottom (A). Elevation direction marking is a single line open head arrow located clear of the front sight post flange hole (B). The inner shape of the letter P is a D.

Note: The letters in ( ) refer to the arrow indicators in the figures.



Top View

Figure 2-41. Front sight of Colt produced M16A1 rifle SN 6418244 (left) and test rifle (right).

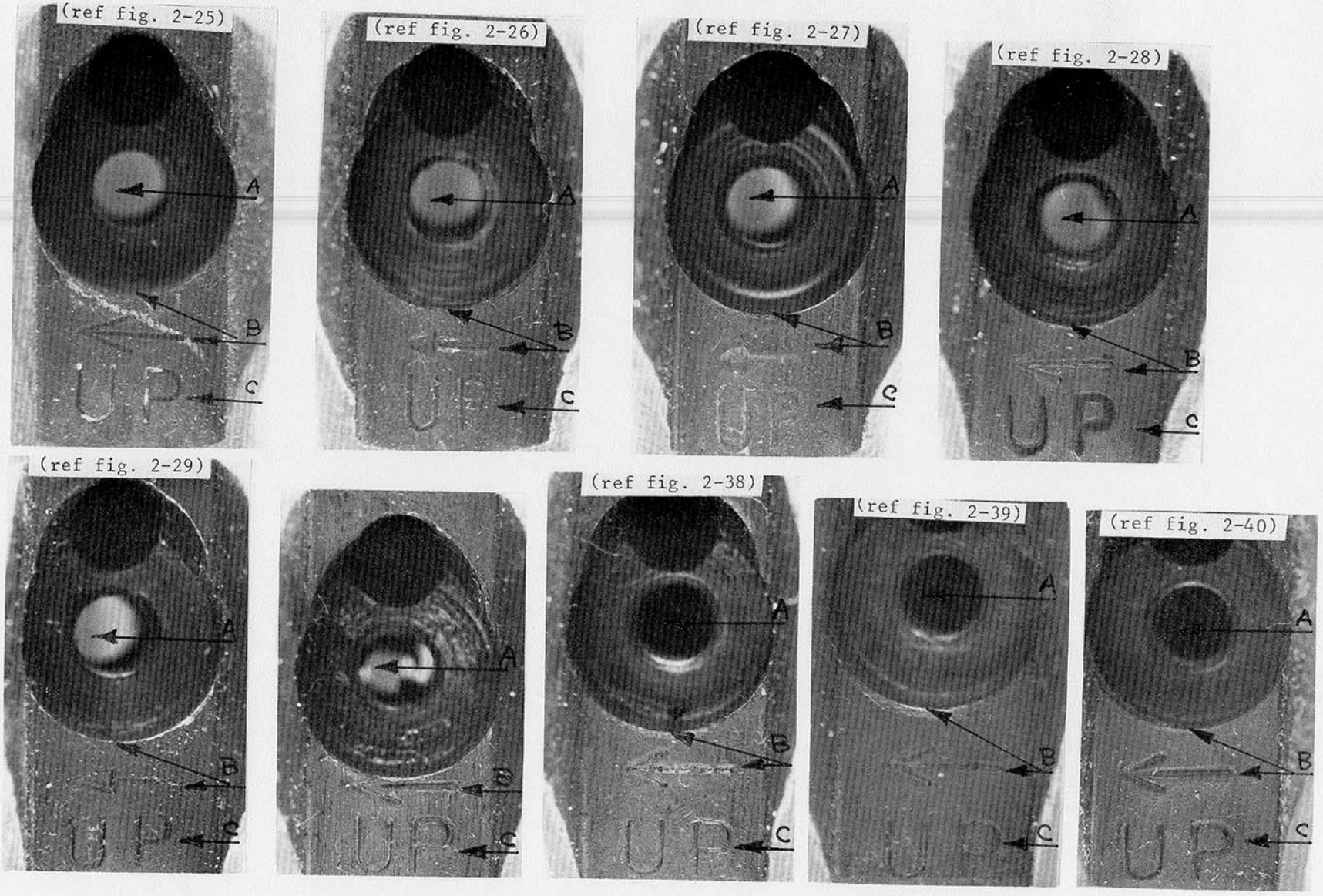
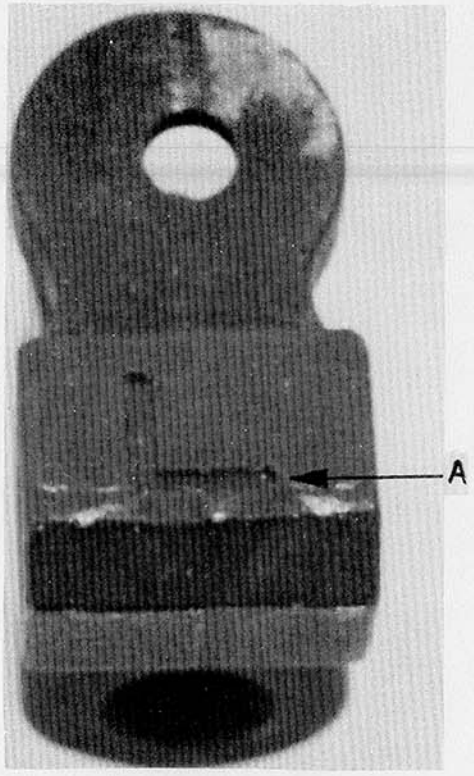


Figure 2-42. Top view of front sights from US supply.

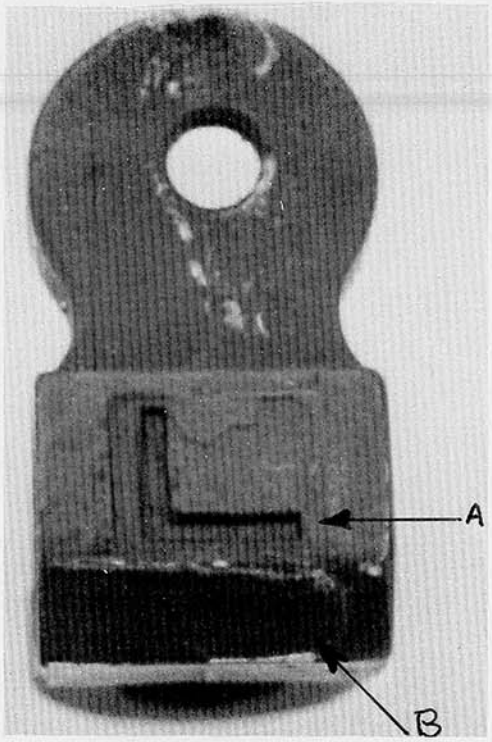
TABLE 2-8. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - REAR SIGHT

Figure No.	Description
2-43	Letter L are all flat bottomed impressions (A). Test rifle sight has indication of sprue gate on bottom bevel, while all other sights do not (B).
2-44	Test rifle sprue gate appears on front of rear (long range) aperature (A) while the Colt rifle has a number "2" mold mark in the same location (A). The 1967 vintage part from US supply has neither of these distinguishing features. The surface finish of the long range aperture hole is rough on the test rifle part and smooth on the others (B). A mold parting line is visible at one or more locations on all three parts (C).

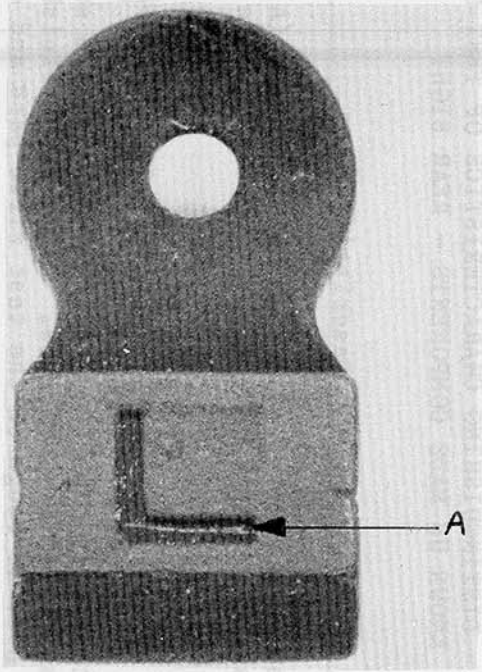
Note: The letters in ( ) refer to the arrow indicators in the figures.



Colt M16A1 rifle SN 6418244



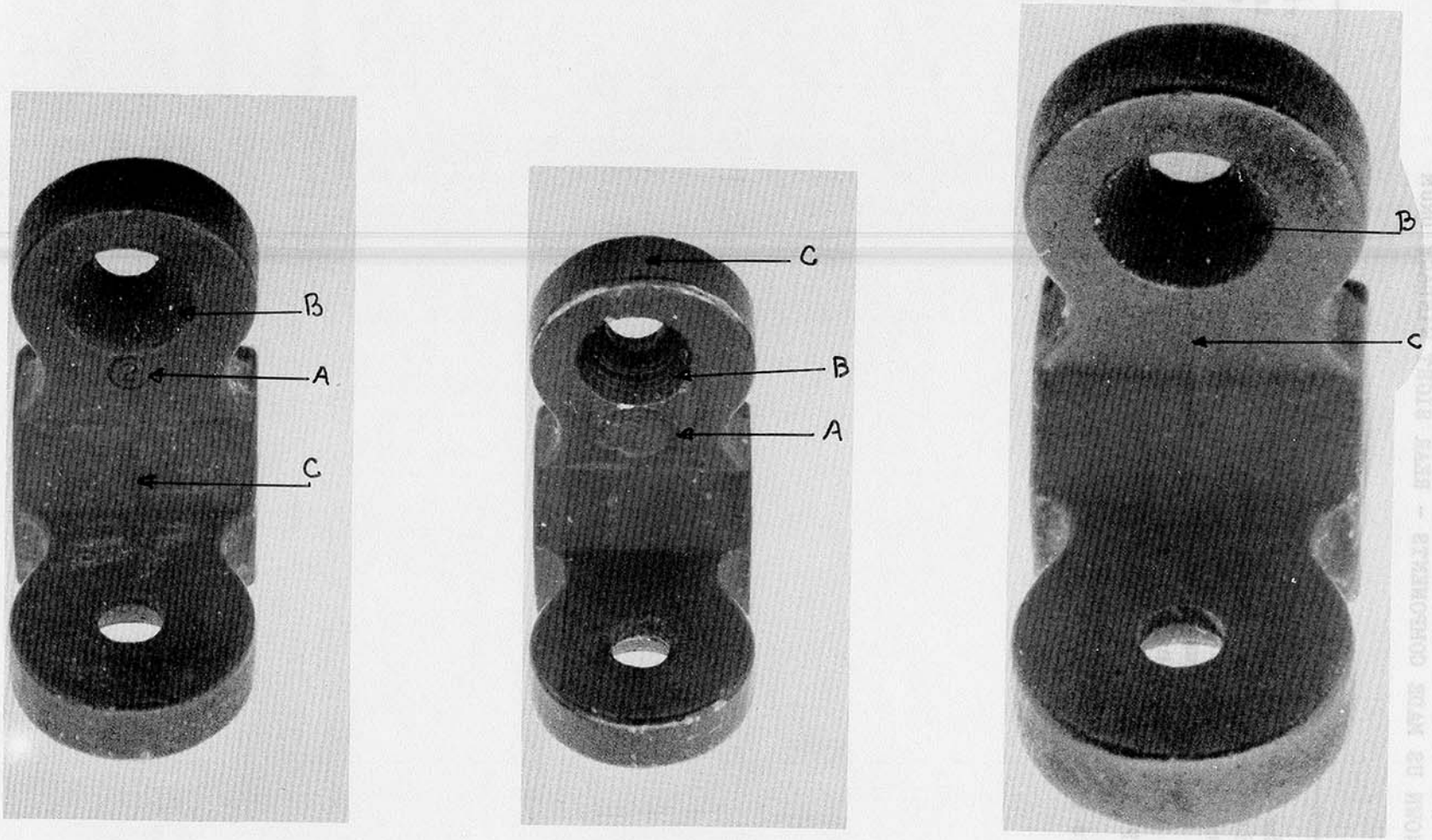
Test rifle



Supply part

Contract DAAF03-66-C-0020 (8/67)

Figure 2-43. Rear view of rear sight (long range setting).



Colt M16A1 rifle SN 6418244

Test rifle

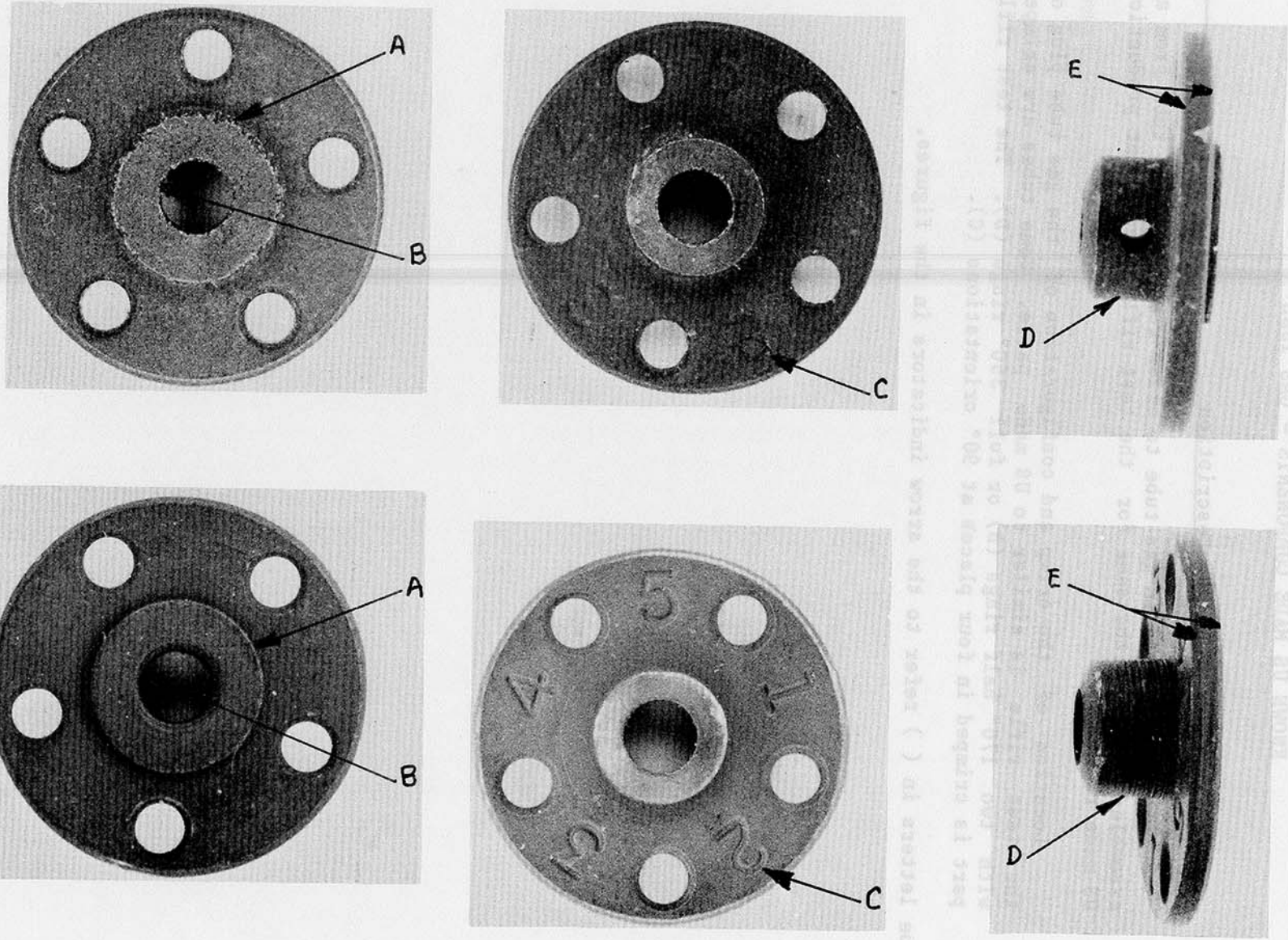
Supply part
Contract DAAF03-66-C-0020 (8/67)

Figure 2-44. Top view of rear sight (all parts not to same scale).

TABLE 2-9. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - REAR SIGHT WINDAGE DRUM

Figure No.	Description
2-45	The test rifle part is machined from bar stock. The Colt rifle part is made from powdered metal (A). There is a chamfer at the inner edge of the center hole on the test rifle part, but none on the Colt rifle part (B). Numerical marking of the drum is different on the two parts (C). Turning marks and edge chambers are present on the test rifle part, but not on the part from the Colt rifle (D and E).

Note: The letters in ( ) refer to the arrow indicators in the figures.



Inside view

Outside view

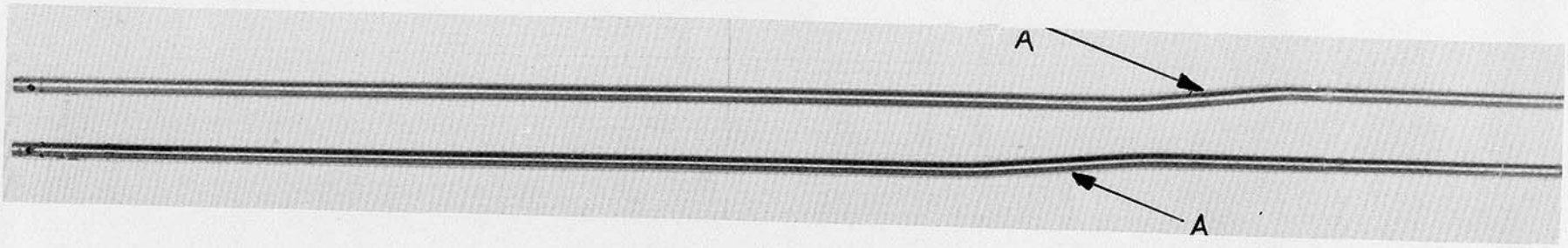
Side view

Figure 2-45. Rear sight windage drum. Top views from Colt M16A1 rifle SN 6418244. Bottom views from test rifle.

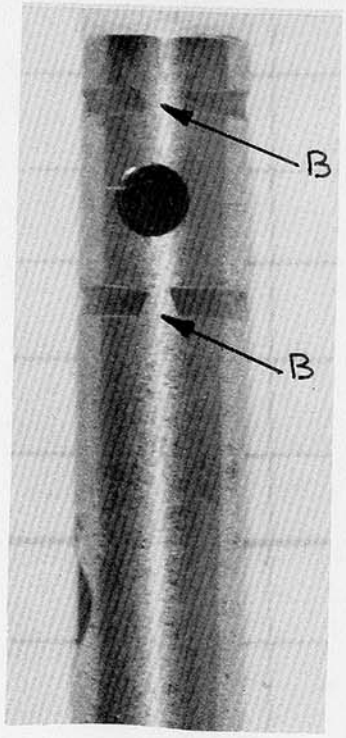
TABLE 2-10. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - GAS TUBE

Figure No.	Description
2-46	Location of bend in gas tube to allow removal of the tube from an assembled rifle is the same for the test rifle and current production US made rifles (A). Location of the crimp and configuration of the gas tube plug of the test rifle is similar to US made parts. Some tubes are crimped with two 170° half rings (B) or full 360° rings (D). The test rifle part is crimped in four places at 90° orientations (C).

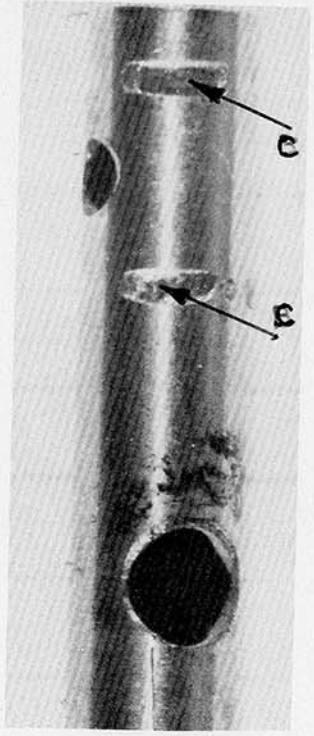
Note: The letters in ( ) refer to the arrow indicators in the figures.



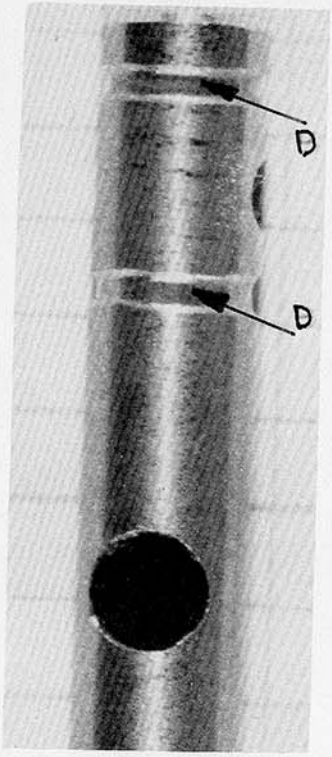
Top: Early production (XM16E1)
Bottom: Current production



Supply part - Contract
DAAF03-66-C-0020 (8/66)



Test rifle



Supply part - Contract
DAAF03-73-C-1769 (6/74)

Figure 2-46. Upper view: gas tubes, complete. Lower views: types of crimps used to retain the gas tube plug.

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TABLE 2-11. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - HANDGUARD

Figure No.	Description
2-47	Test rifle handguards are devoid of any markings.
2-48	Handguards from Colt rifle SN 6418244 have R and L stamped letters on the handguard liners to denote right and left half (A). Two holes appear on the bottom edge of each handguard half section (B).
2-49, 2-50, 2-51	Test rifle handguards, with the aluminum heat shield removed, show the same pattern of line attachment pylons (A), but different liner support bosses (D), sprues (B), and support ribs (C) than do current production Colt rifle handguards. The US Supply handguard (circa 1968) closely resembles that of the test item with respect to (A), (C), (D), and (E), but the number and location of sprues (15 for the test and 12 for the US produced parts) is different. The 1968 vintage handguard liner is similar to that of the test item (no letter marking) but has the two holes at the bottom edge, the same as current Colt rifle parts.
2-52, 2-53	Markings in the plastic of the handguards was only found on the current production Colt rifle parts. These markings are raised letters and numbers and are formed during the molding process. There is indication that a mold modification was made to remove markings from the test handguard. Location of the markings or lack thereof are shown as (E) in Figures 2-49, 2-50, and 2-51.

Note: The letters in ( ) refer to the arrow indicators in the figures.

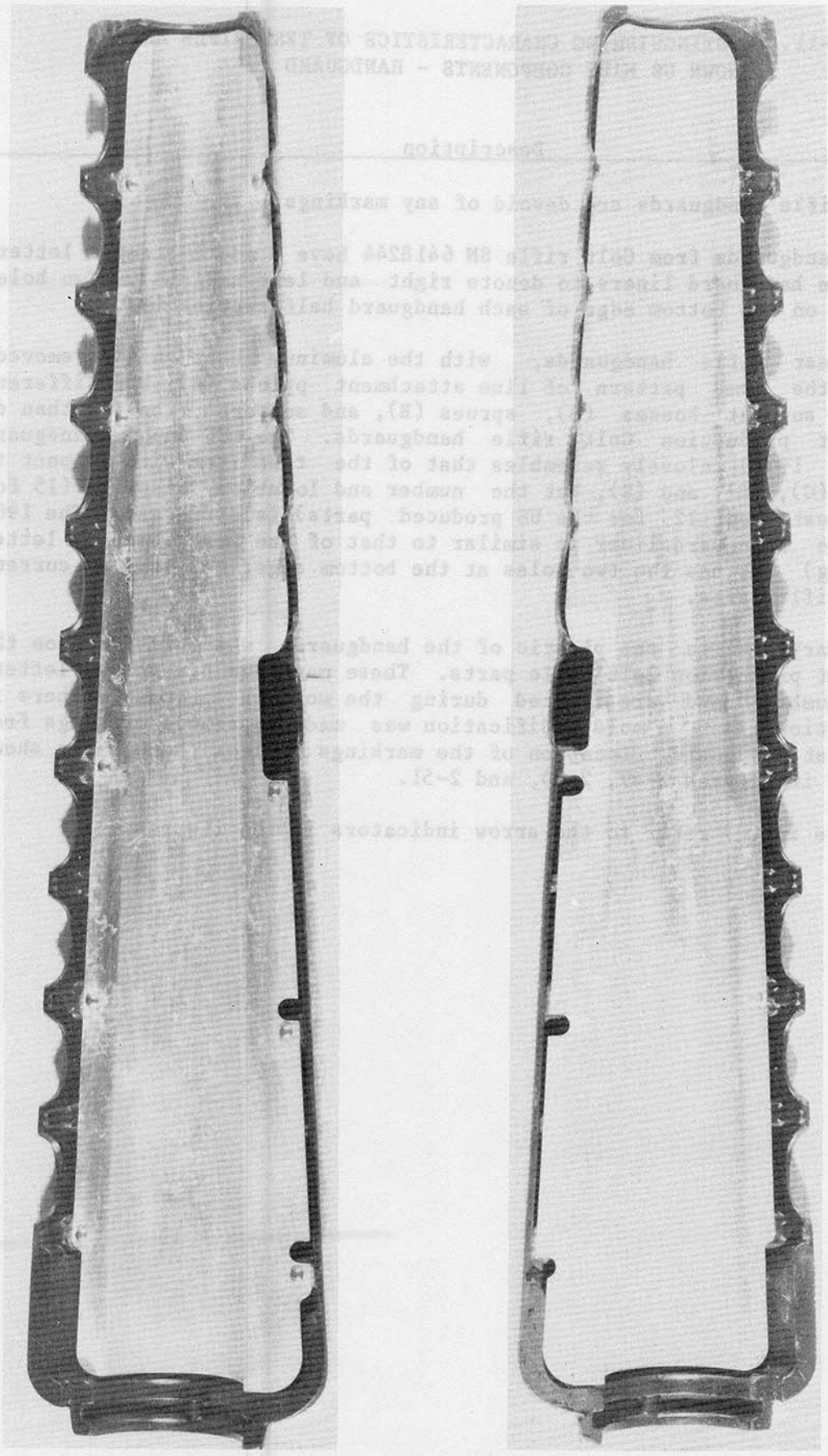


Figure 2-47. Test rifle handguards. Left half at top; right half at bottom.

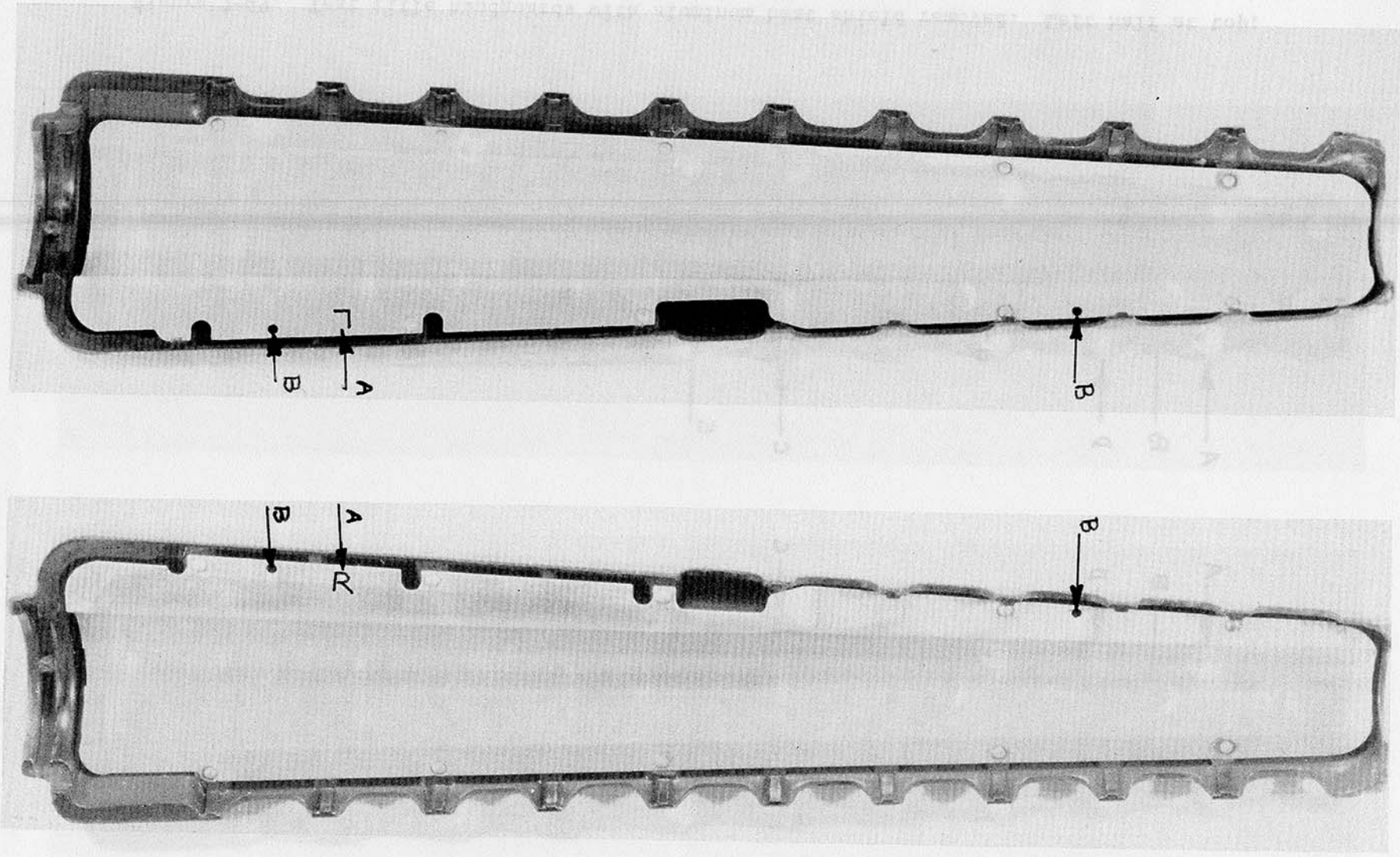


Figure 2-48. Colt M16A1 rifle, SN 6418244, handguards, left half at top; right half at bottom.

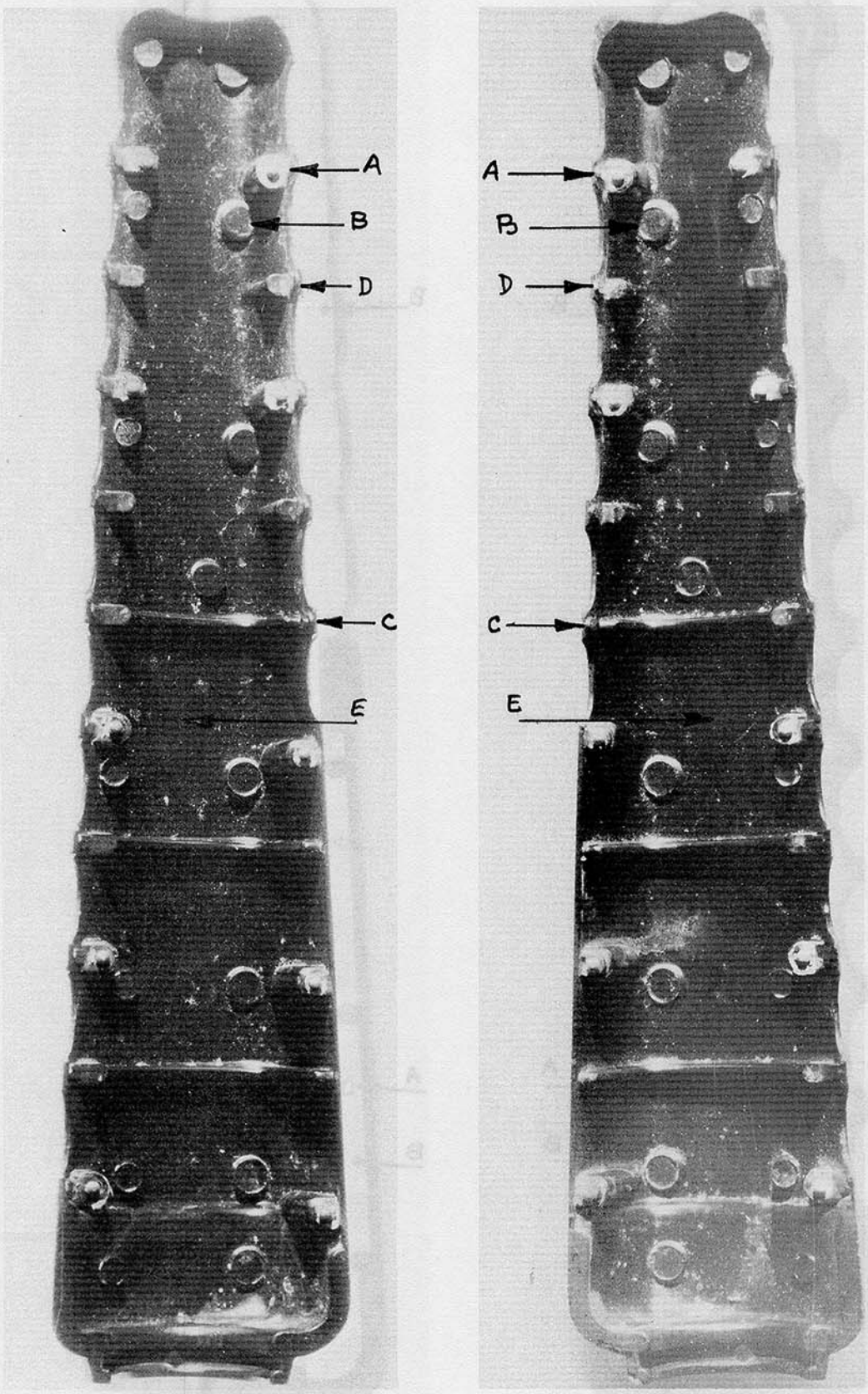


Figure 2-49. Test rifle handguards with aluminum heat shield removed. Left half at top; right half at bottom.

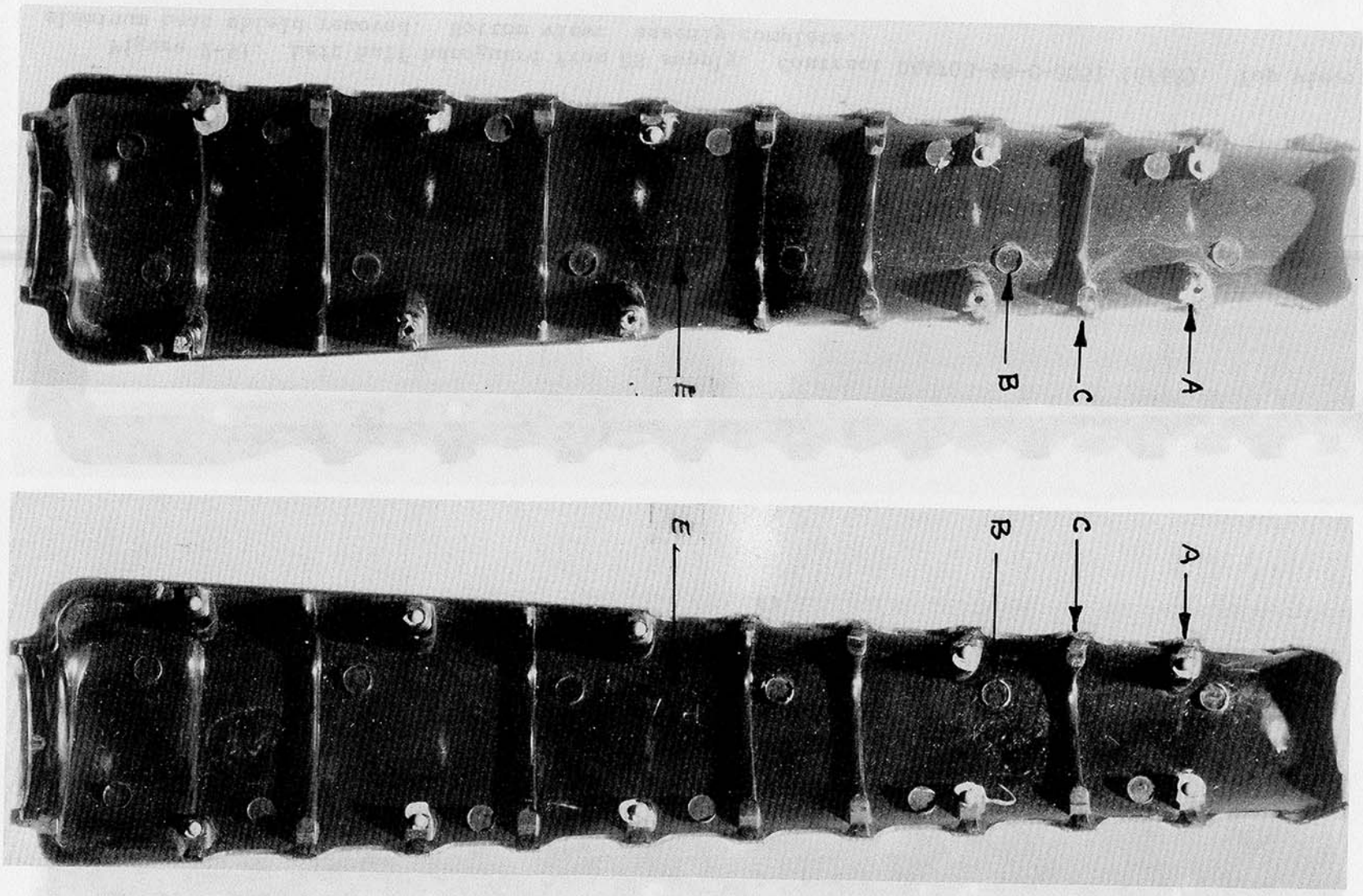


Figure 2-50. Colt M16A1 rifle (SN 6418244) handguards with aluminum heat shield removed. Left half at top; right half at bottom.

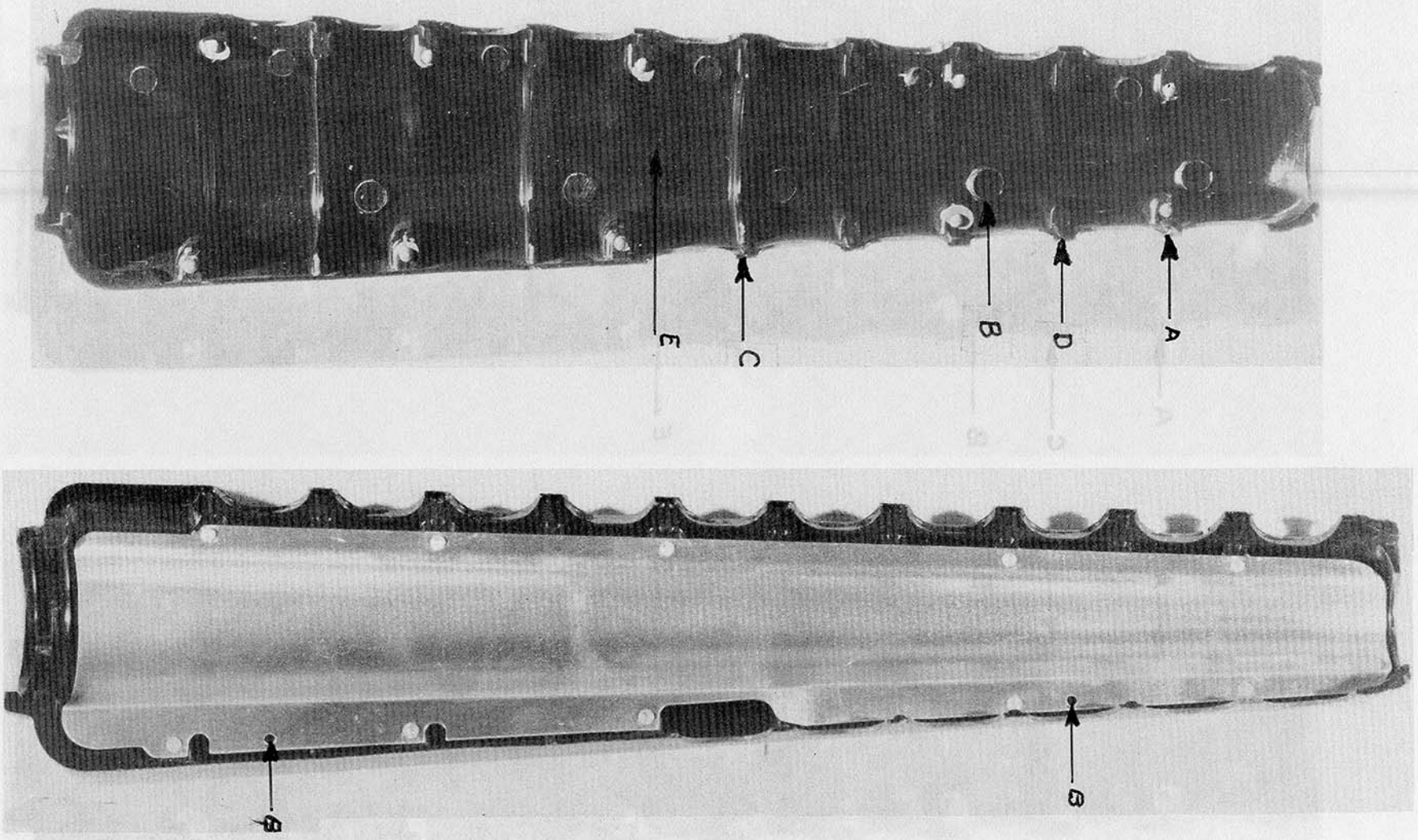


Figure 2-51. Left half handguard from US supply. Contract DAAF03-68-C-0051 (6/68). Top view: aluminum heat shield removed. Bottom view: assemly complete.

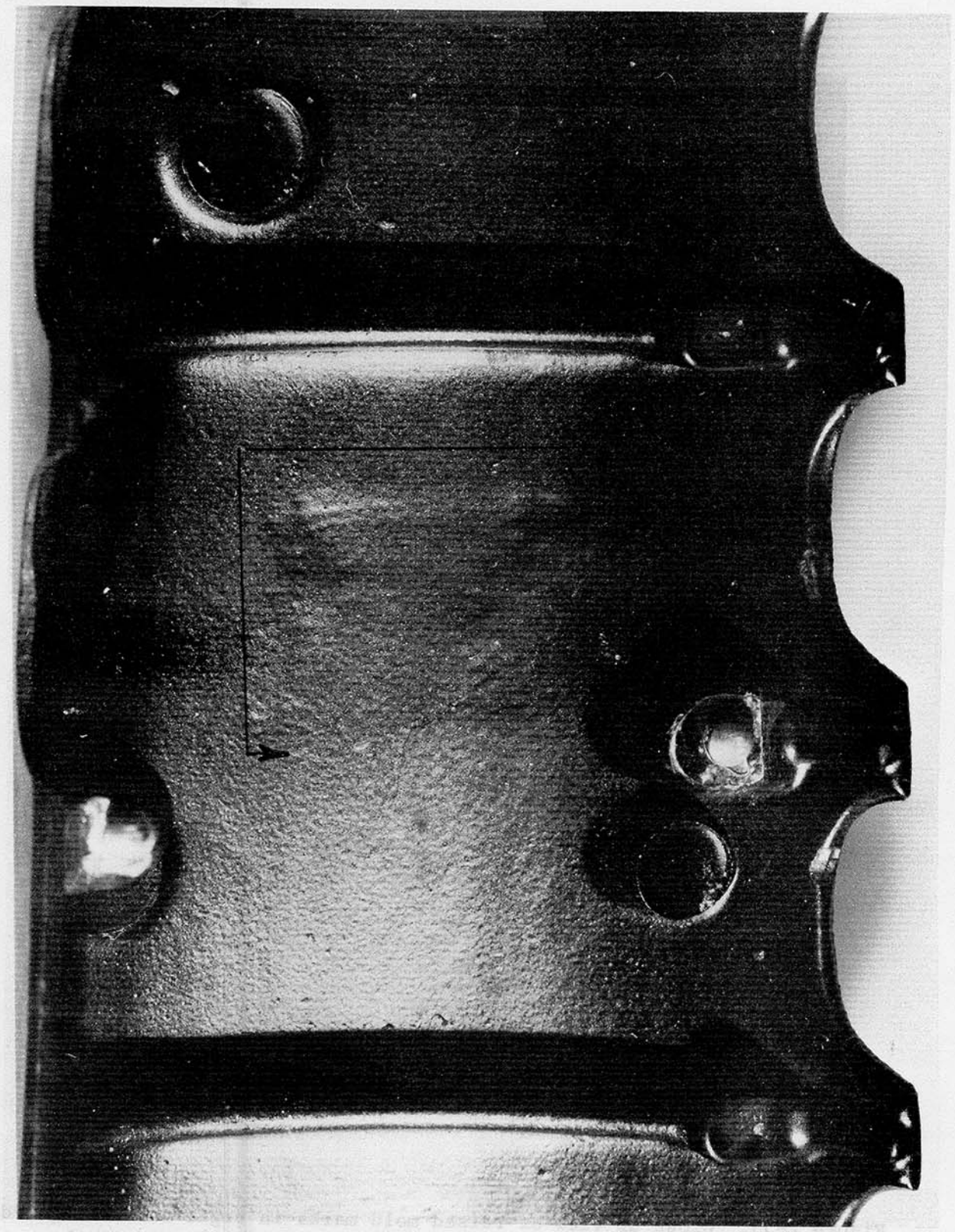


Figure 2-52. Close-up view of right half handguard of test rifle with aluminum heat shield removed to show apparent die grinding to remove identification marks.

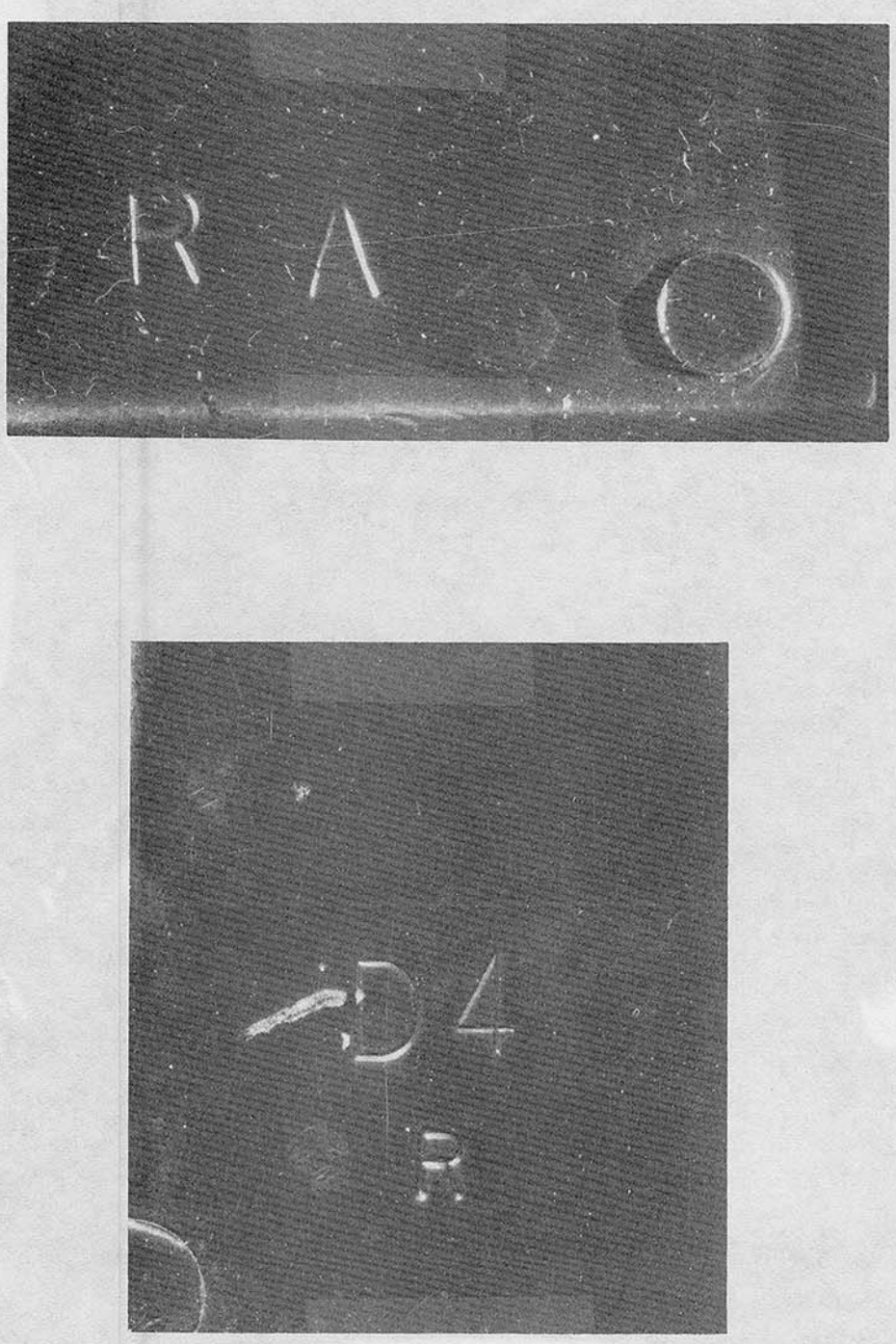


Figure 2-53. Close-up view of raised mold marks in right half handguard (aluminum heat shield removed) of Colt M16A1 SN 6418244 (top), and another US supply part of current production configuration (bottom).

TABLE 2-12. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - EJECTION PORT COVER ASSEMBLY

Figure No.	Description
2-54 thru 2-57	The basic differences in ejection port covers is in the shape of the latch body on the outside (A), inside (B), and means of retaining the detent plunger (C). The majority of original equipment parts found on Colt producted rifles use a small snap ring to retain the detent plunger (fig. 2-35C). The flat external surface of the latch body (fig. 2-35A and 2-57A) differs from the raised surface shown in Figures 2-54A and 2-56A. There is no clear cut vintage associated with this design change as current production Colt rifles use the flat design part. Apparently, use of this older design is based on using up existing supplies of parts before changing to the new design raised part. The function of this raised surface is to prevent interference with the cover and lower receiver, and permit easier closing when using a gloved hand as the cover extends out from the receiver instead of lying flush with it.

Note: The letters in ( ) refer to the arrow indicators in the figures.

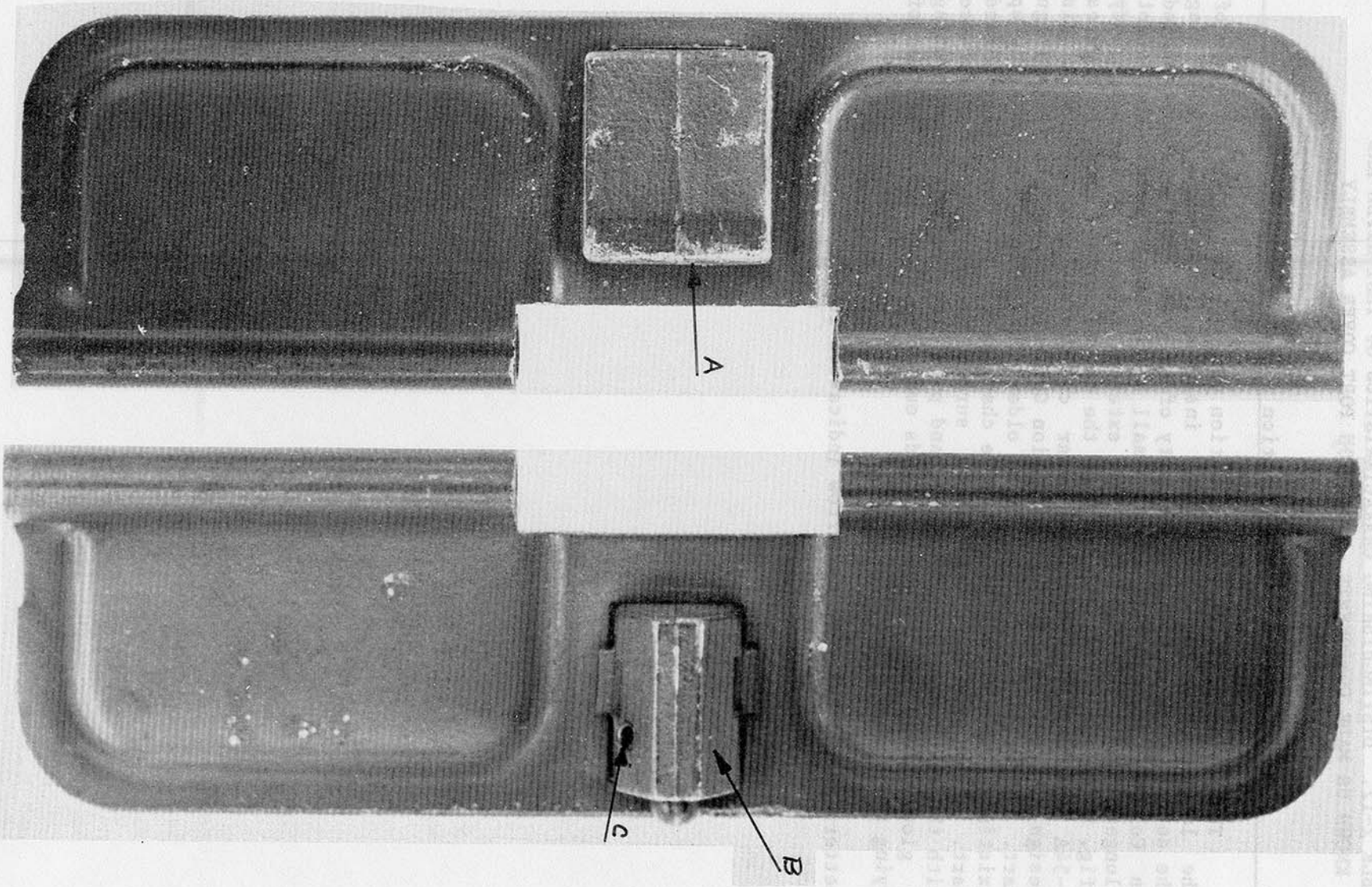


Figure 2-54. Test rifle ejection port cover assembly. Outside view at top, inside view at bottom.

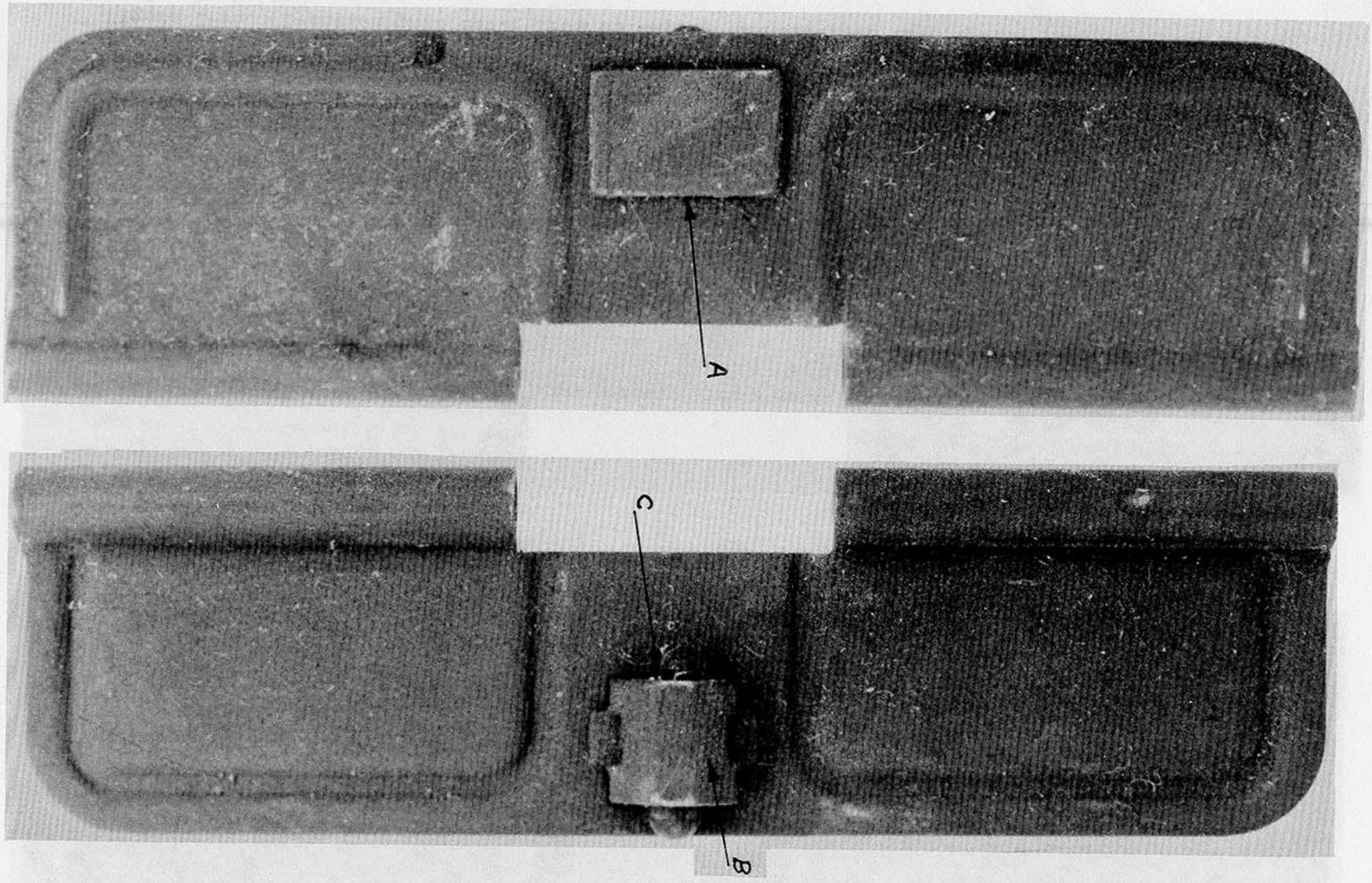


Figure 2-55. Colt M16A1 rifle SN 6418244, ejection port cover assembly. Outside view at top. Inside view at bottom.

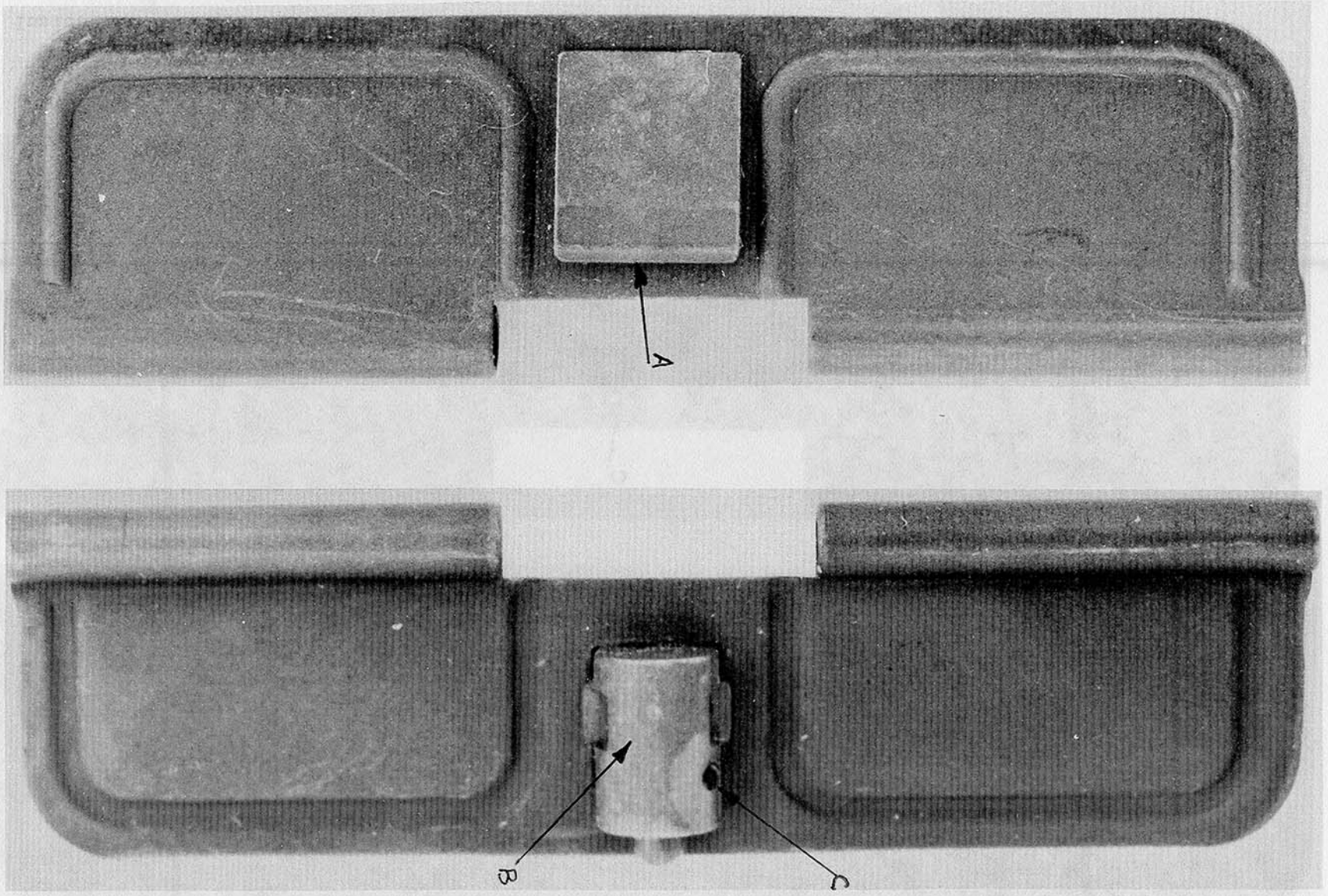


Figure 2-56. Ejection port cover from US supply (manufacture date 2/81). Outside view at top. Inside view at bottom.

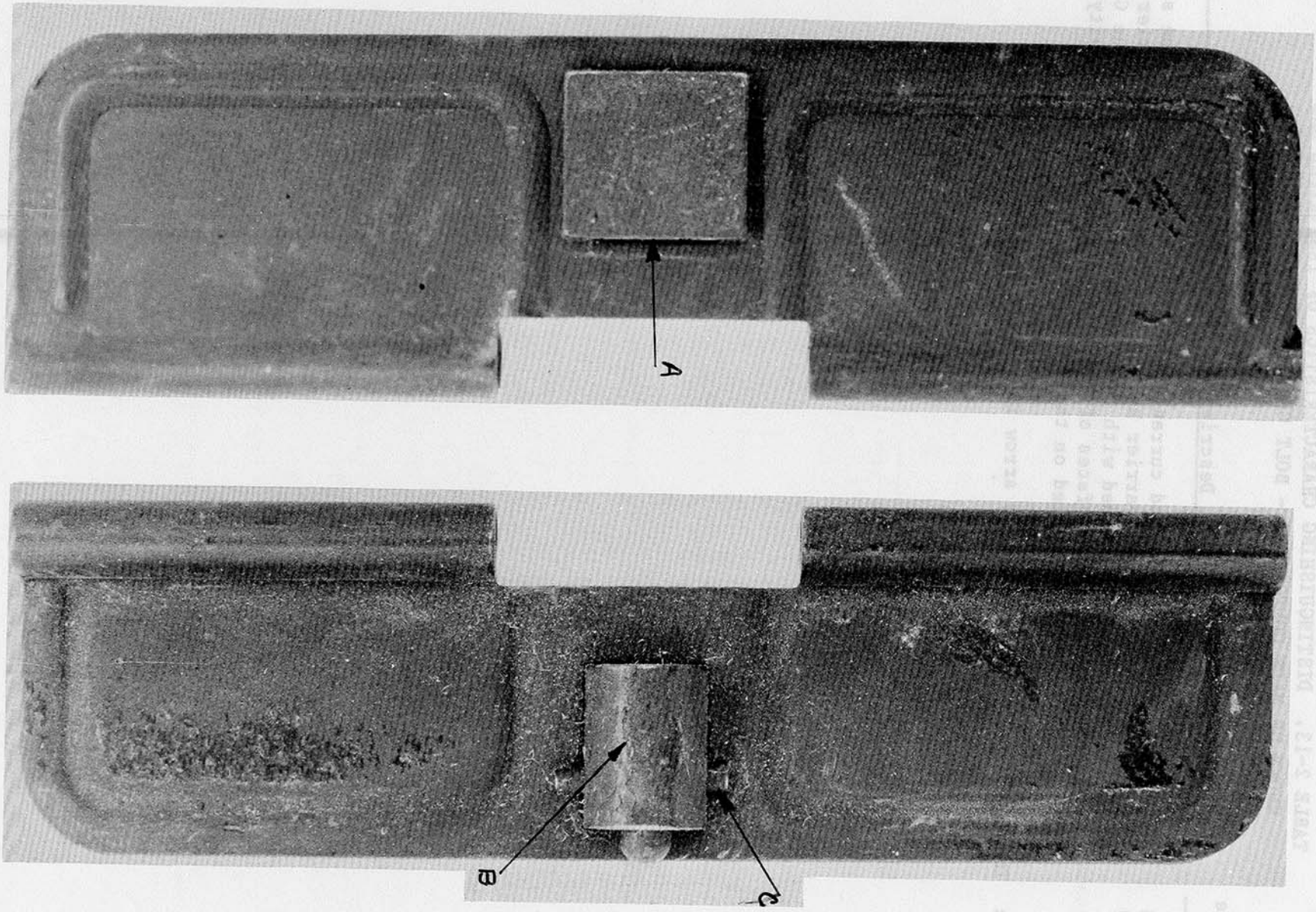


Figure 2-57. Ejection port cover from US supply. Outside view at top. Inside view at bottom.

TABLE 2-13. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - BOLT CARRIER AND KEY ASSEMBLY

Figure No.	Description
2-58 2-59	Both the test rifle and current production Colt rifle use the same method of retaining the carrier key screws (A). The bolt carrier of the test rifle is not stamped with a manufacturer's mark as is the Colt rifle. Both internal surfaces of the carrier key and bolt cavity of the carrier are chrome plated on the two items inspected (C).

Note: The letters in ( ) refer to the arrow indicators on the figures.

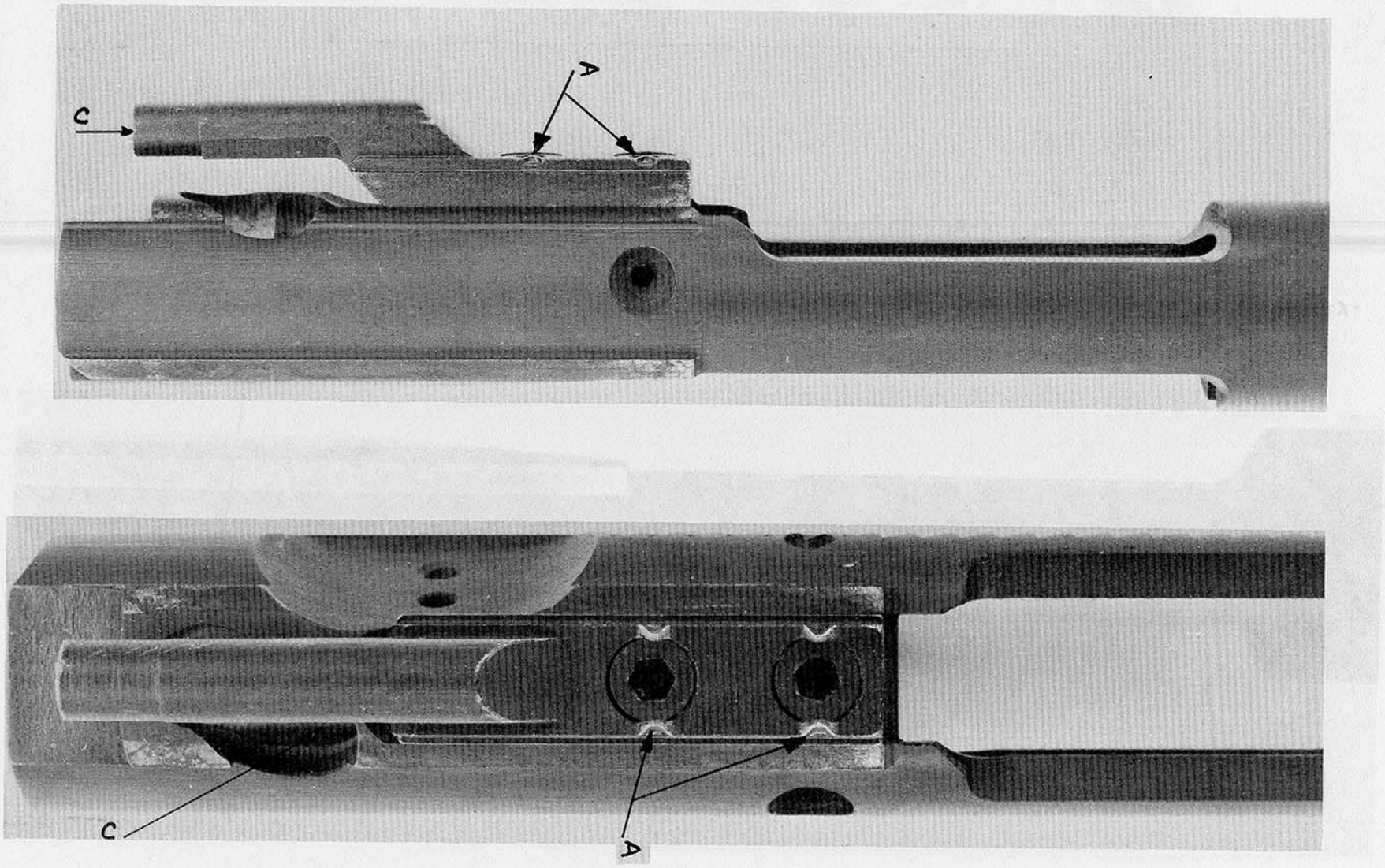


Figure 2-58. Test rifle bolt carrier and carrier key assembly. Left side view of assembly (top), top view of assembly (bottom).

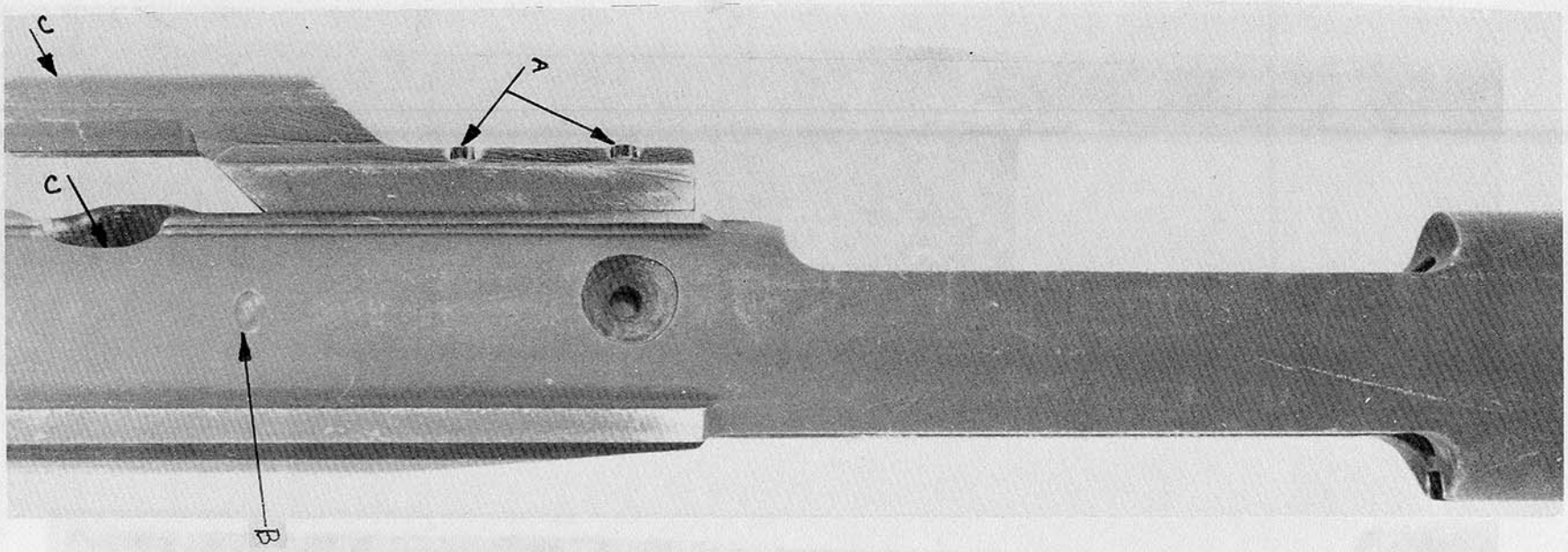
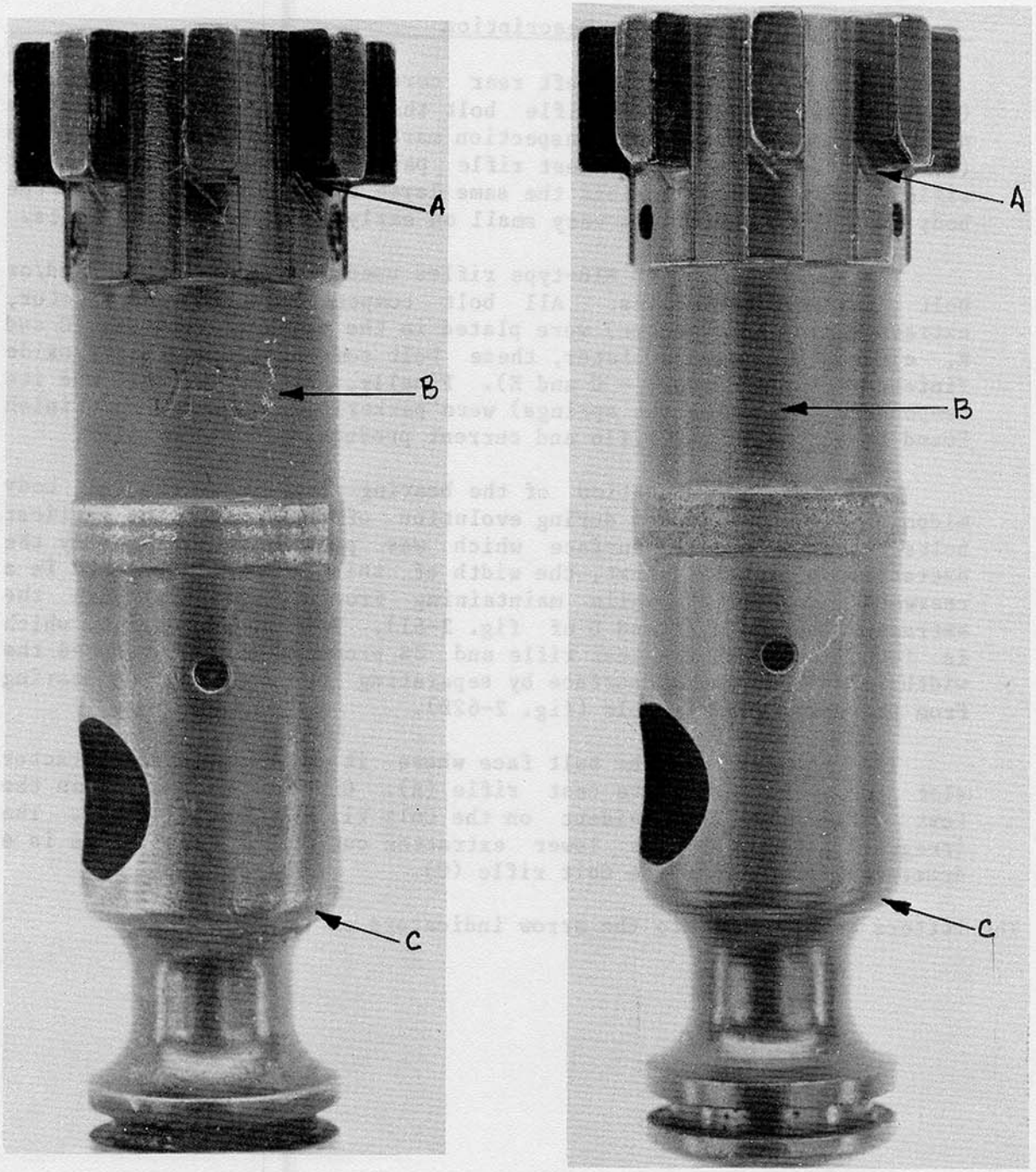


Figure 2-59. Colt M16A1 rifle SN 6418244. Left side view of bolt carrier and carrier key assembly.

TABLE 2-14. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - BOLT

Figure No.	Description
2-60 2-61	The bevel cuts on the left rear corner of the seven locking lugs (A) are larger on the test rifle bolt than on US produced parts. The proof and magnetic particle inspection marks found on US produced parts (B) are not found on the test rifle part. The test rifle and M16A1 rifle (SN 6418244) exhibit the same large radius on the rear of the body (C). This radius was very small on early (pre 1970) rifle bolts.
2-61	The early production M16-type rifles used electrolized bolt and/or bolt carrier assemblies. All bolt components (i.e., extractor, extractor pin, and ejector) were plated in the earliest versions (C and E, ejector not shown). Later, these bolt components were black oxide finished (second type - C and E). Finally, the entire bolt and its components (excluding the springs) were parkerized, which is the finish found on both the test rifle and current production US made rifle.
2-61 2-62	The size and location of the bearing surface at the bolt body midpoint (D) has changed during evolution of the rifle. The earliest bolts used a narrow surface which was partially cleaved by the extractor pin hole. Next, the width of this band was increased in a rearward direction while maintaining frontal registry with the extractor pin hole (C and D of fig. 2-61). The current design, which is found on both the test rifle and US produced rifles, reduced the width of the bearing surface by separating the front of the bearing from the extractor pin hole (fig. 2-62D).
2-62	The chamfer of the bolt face where it intersects the extractor slot cut is larger in the test rifle (A). Circular tool marks on the test rifle are not evident on the Colt rifle SN 6418244 (B). The irregular shape of the lower extractor cut on the test rifle is a symetrical surface on the Colt rifle (C).

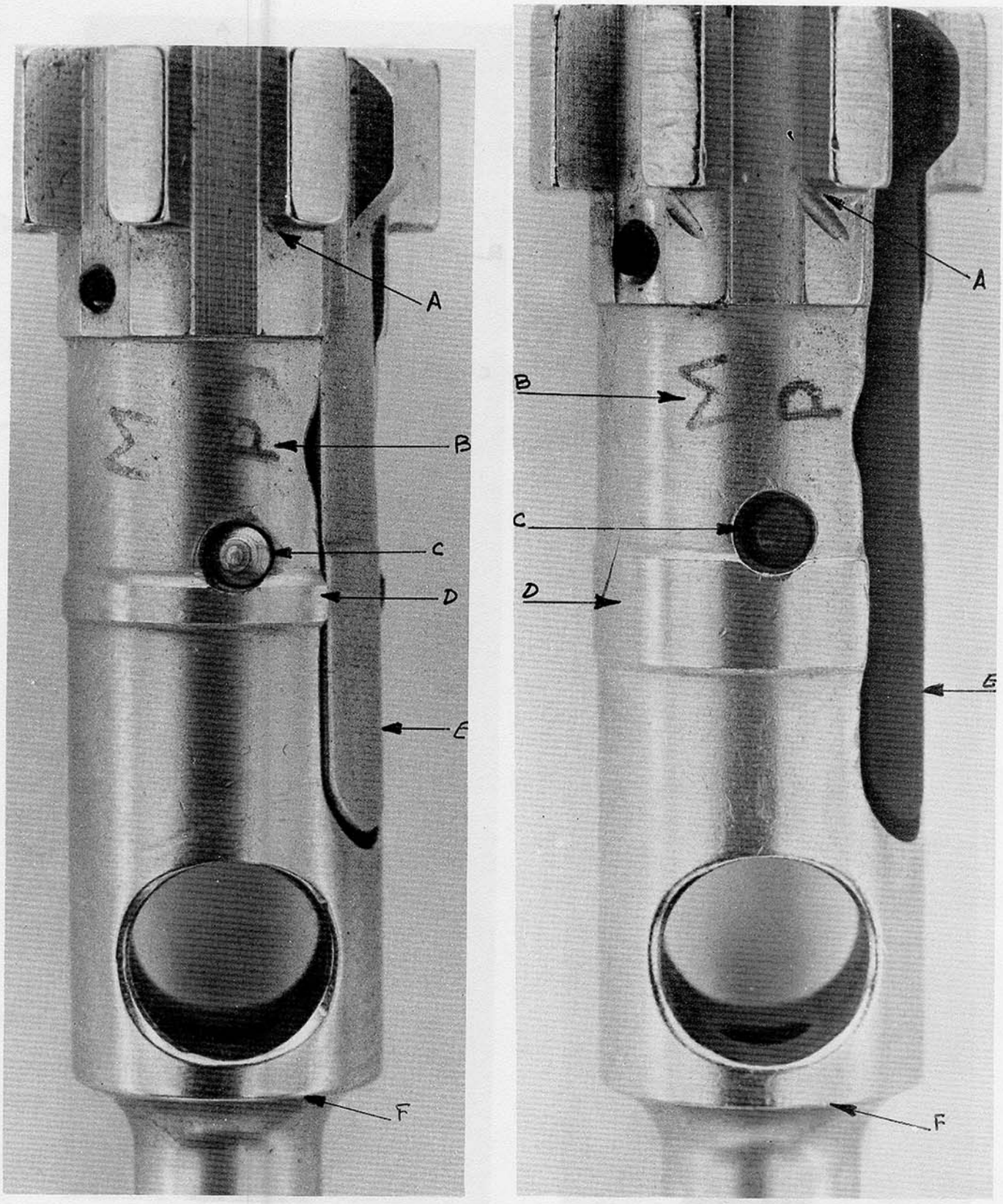
Note: The letters in ( ) refer to the arrow indicators on the figures.



Colt M16A1 rifle SN 6418244

Test rifle

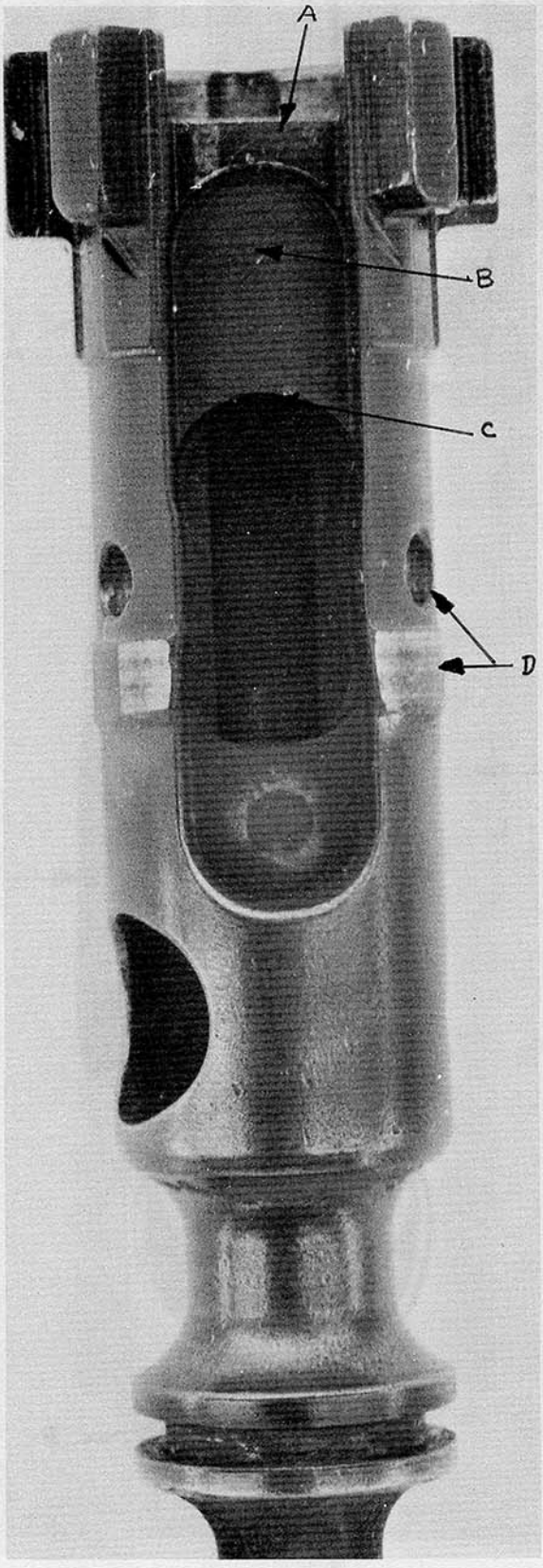
Figure 2-60. Bolt, showing view of bolt body 180° from extractor cut.

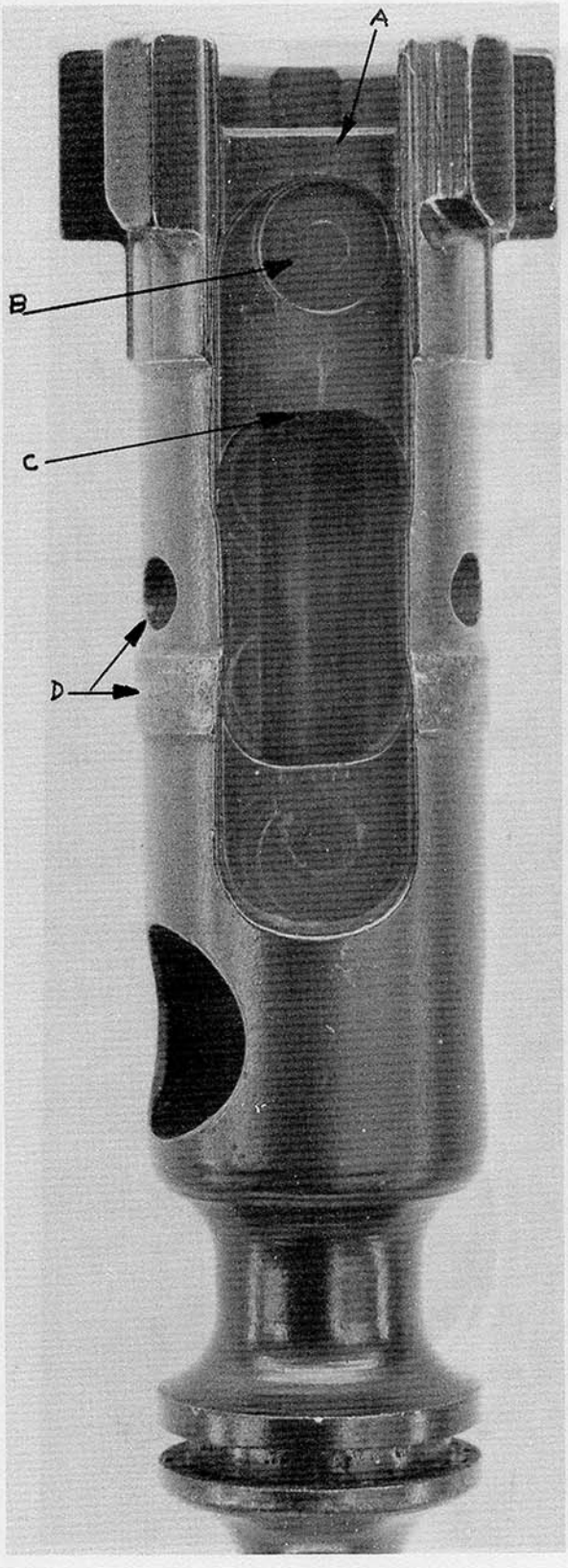


First type

Second type

Figure 2-61. Early production (pre 1970) electrolized (chrome plated) bolts.





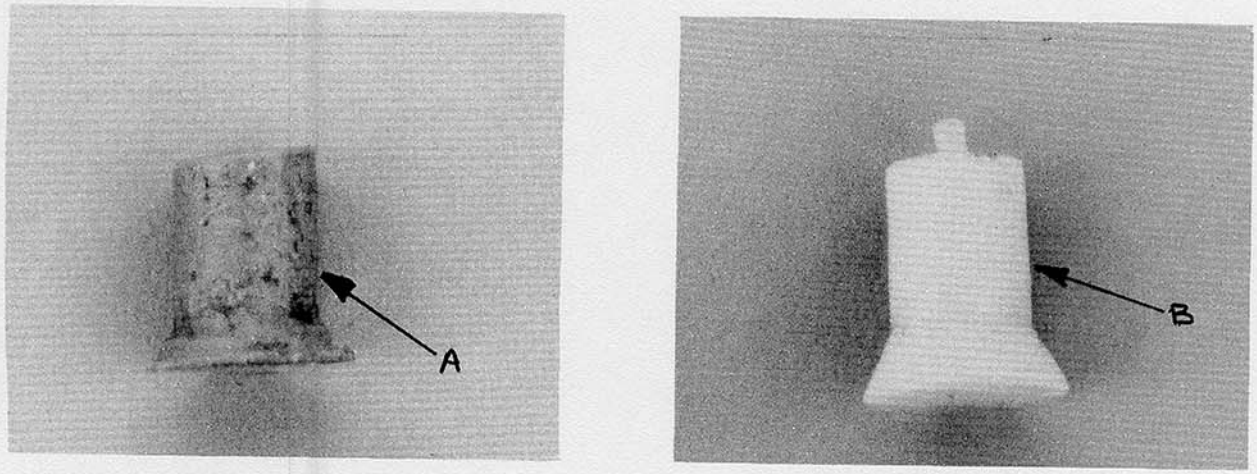
Colt M16A1 rifle SN 6418244 Test rifle

Figure 2-62. Bolt, showing view through extractor cut.

TABLE 2-15. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - EXTRACTOR SPRING BUFFER

Figure No.	Description
2-63	The original extractor spring in M16 type rifles was a 5-coil unbuffered spring. Changes in design, occurred in 1971 which reduced the number of coils to four and inserted a polymeric buffer inside the coils. The original design, and color was red (A). The test rifle part (B) was found to be a more symmetrical shape, and white in color. Both Colt rifle SN 6418244 and the test rifle used extractor springs of identical configuration. Within the past ten years the use of an extractor spring buffer of this design and color of the test rifle have been found in the new Colt produced M16A2 rifle, and in some Anniston Army Depot rebuilt M16A1 rifles dated 1977.

Note: The letters in ( ) refer to the arrow indicators on the figures.



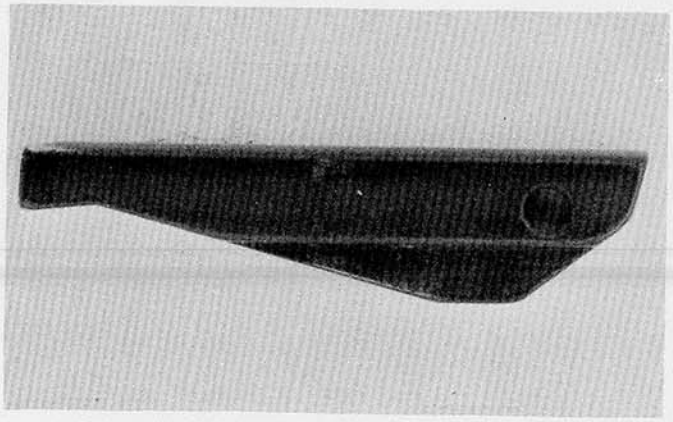
Colt M16A1 rifle SN 6418244 Test rifle

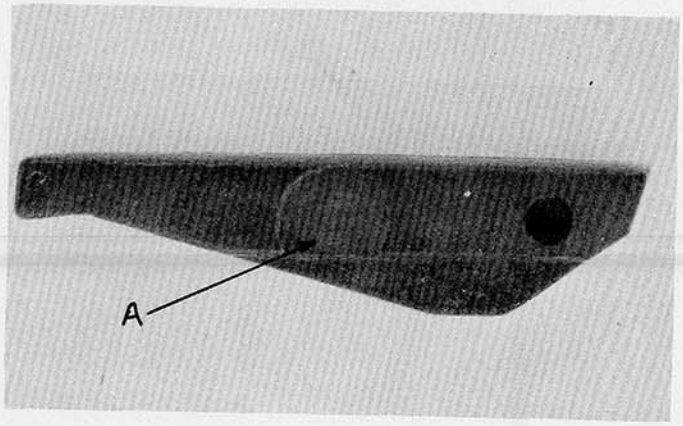
Figure 2-63. Extractor spring buffer.

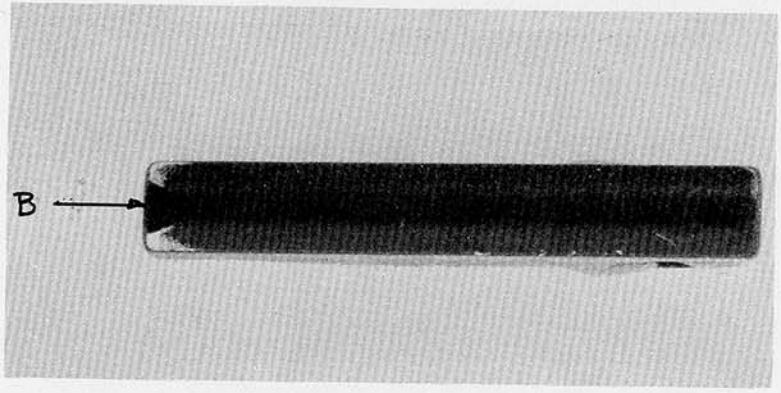
TABLE 2-16. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FORWARD ASSIST PAWL

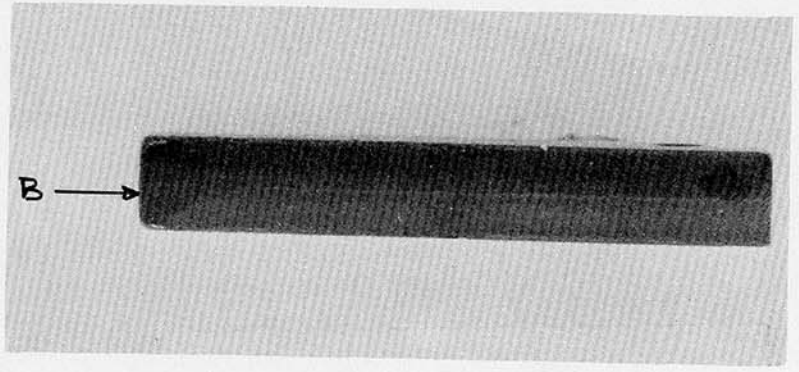
Figure No.	Description
2-64	The two pawls shown in the figure are of similar design and construction. Both are made by precision casting from steel. Small differences are shown in the apparent sprue removal by an end mill cut (A), and differences in amount of as-cast chamfer on the front end of the part (B).

Note: The letters in ( ) refer to the arrow indicators on the figures.









Colt M16A1 rifle SN 6418244

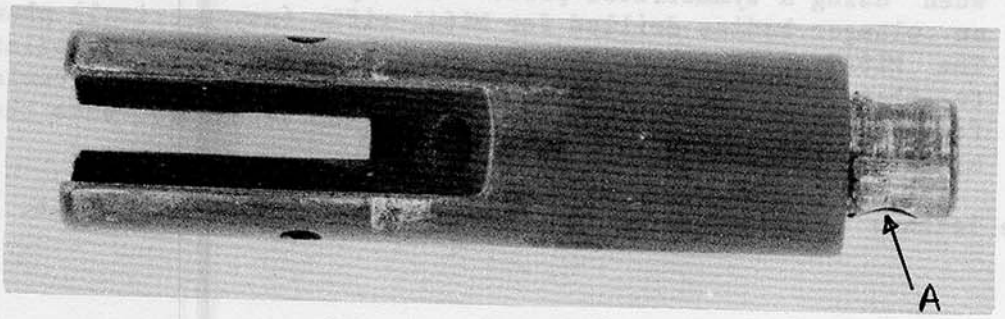
Test rifle

Figure 2-64. Forward assist pawls. Top views at top; right side view at bottom.

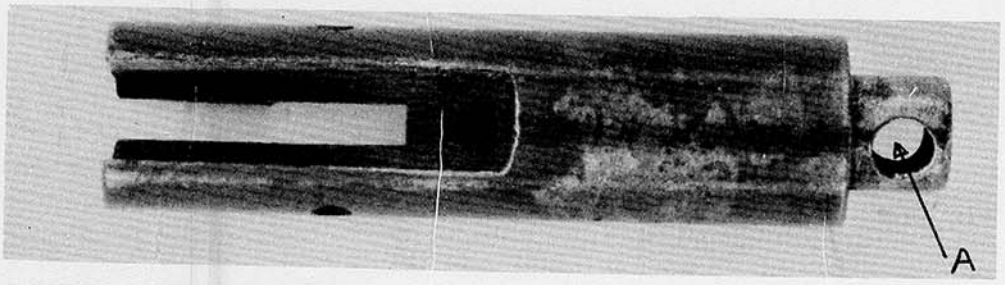
TABLE 2-17. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FORWARD ASSIST PLUNGER BODY

Figure No.	Description
2-65	The basic parts shown are similar in design and construction. They both are steel rod; turned, milled, and drilled to produce their final shape. The minor difference consists of the orientation of the hole for the plunger cap pin (A).

Note: The letters in ( ) refer to the arrow indicators on the figures.



Colt M16A1 rifle SN 6418244



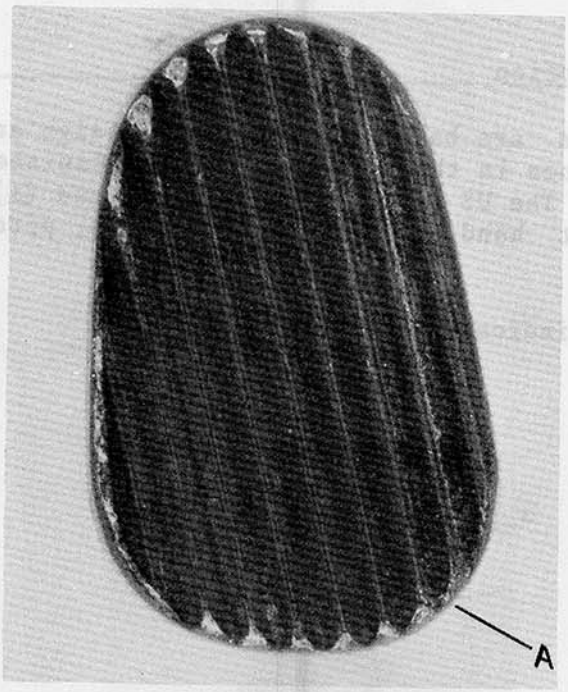
Test rifle

Figure 2-65. Forward assist plunger body right side view.

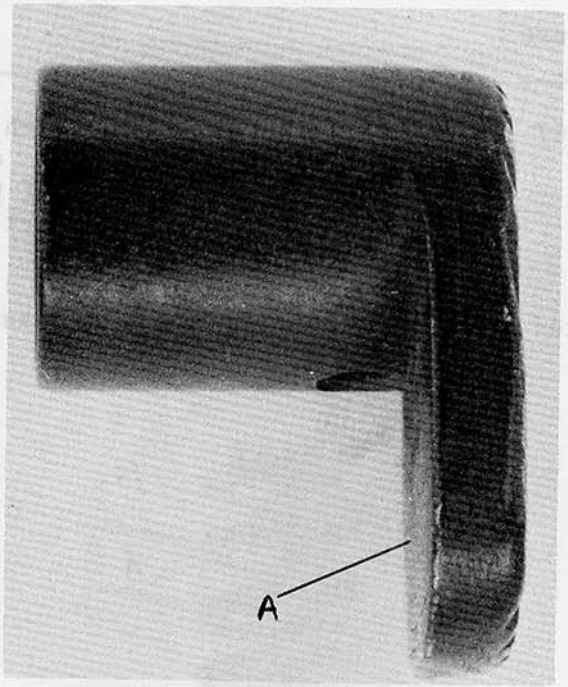
TABLE 2-18. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FORWARD ASSIST PLUNGER CAP

Figure No.	Description
2-66	Although the function of this part is the same for both rifles, their external configuration is quite different and their method of manufacture also differs. The US made part (A) utilizes an asymmetrical shape made by precision casting which is then drilled for the plunger body (fig. 2-65) and its transverse retaining pin. The symmetrical test rifle part (B) is externally configured by turning on a lathe, in addition to being drilled for acceptance of the plunger body and transverse retaining pin. It should be noted that although the location of the transverse pin hole on the asymmetrical part was top to bottom, there is no reason to change orientation of the hole when using a symmetrical part. The symmetrical head can be installed on plunger bodies drilled for M16A1 rifle (asymmetrical) plunger caps. The M16A2 rifle, which uses a symmetrical plunger cap similar in shape to that of the test rifle (the M16A2 part has a flat circular grooved face and a flat cut on the edge facing the receiver), uses the original M16A1 rifle plunger body.

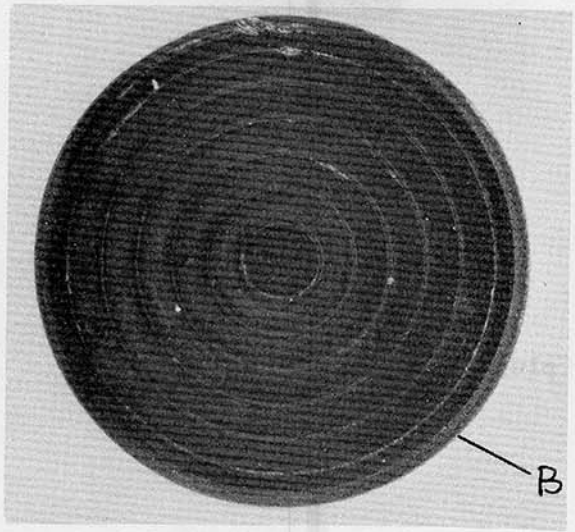
Note: The letters in ( ) refer to the arrow indicators on the figures.



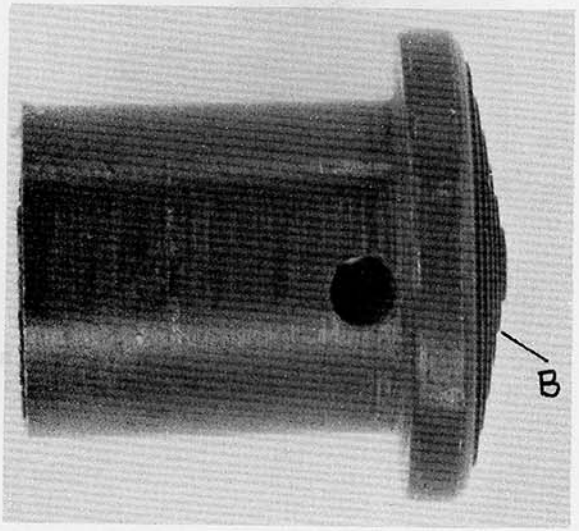
Rear end view



Left side view



Rear end view



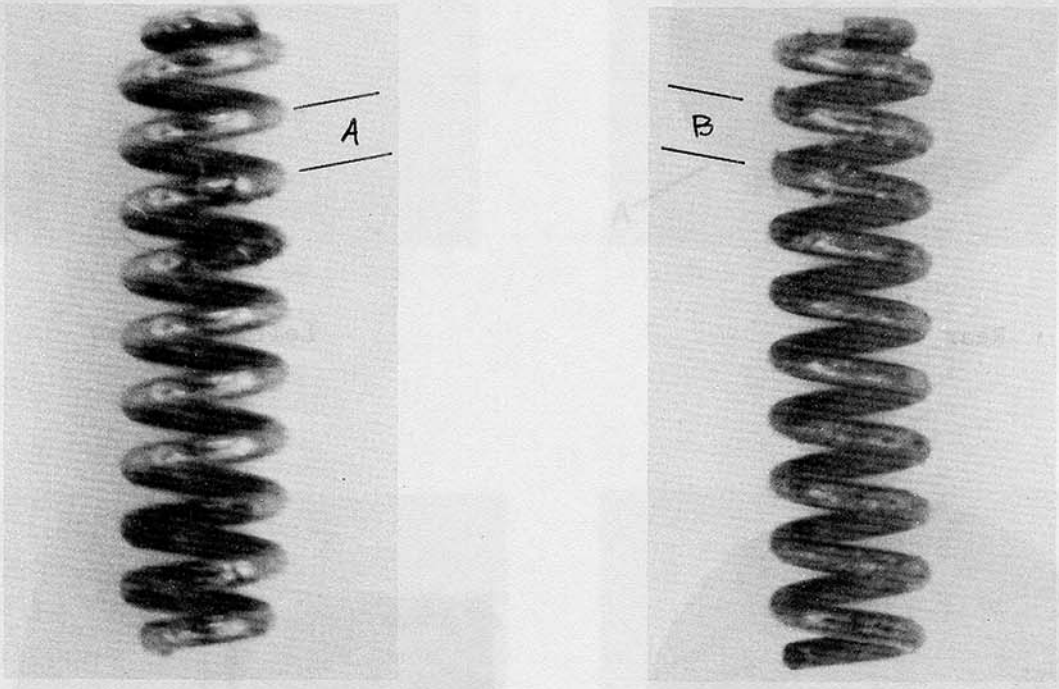
Left side view

Figure 2-66. Forward assist plunger cap. Top views from Colt M16A2 rifle SN 6418244. Bottom views from test rifle.

TABLE 2-19. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - FORWARD ASSIST PLUNGER SPRING

Figure No.	Description
2-67	The springs of both rifles are basically the same design and composition. The noted difference in the unplated, bright finished springs is direction of pitch. The US made part is right hand (A), while the test rifle part is left hand (B). In US production, pitch direction is optional.

Note: The letters in ( ) refer to the arrow indicators on the figures.



Colt M16A1 rifle SN 6418244 Test rifle

Figure 2-67. Forward assist plunger spring.

TABLE 2-20. DISTINGUISHING CHARACTERISTICS OF TEST RIFLE AND KNOWN US MADE COMPONENTS - LOWER RECEIVER

Figure No.	Description
2-3, 2-4	Left and right side views of markings of the known, US Government approved M16/M16A1 rifle lower receivers.
2-68 2-69	Left side view markings (A) on the test rifle consists of SAFE, SEMI, and AUTO. All are in English. There is no indication of defacement of the receiver at that location or other locations where manufacturers identification and serial number markings are normally found. These other locations are shown in the Colt produced rifle (B) and (C), and Figures 2-2, 2-3, and 2-4.
2-70 2-71	There are no machine made markings on the right side of either the test or Colt rifle lower reciever. The No. 2 shown on the Colt rifle was a test agency applied number.
2-72	There is a difference in the means of removing the rough flashing from the bottom of the lower receiver (A and B). The test rifle partially grinds and polishes (A) and machines (B) while the Colt rifle uses grinding to remove only excess metal at these two locations. The front edge of the magazine well is slightly different (C) due to the manner in which the front face of the lower receiver is machined.
2-73	The front face of the Colt lower receiver is milled flat (A). The flange (B) is also machined. The test rifle surface is ground by hand (A) and also filed (B). Only the Colt rifle is marked with a final acceptance mark (white paint).
2-74	Whenever a serial number is stamped into, or rolled onto the thin receiver side wall, there is a tendency for the marking to intrude into the magazine well. This was found to be the case with the Colt rifle (A). There was no sign of serial number marking, or its removal, in the magazine well of the test rifle.

Note: The letters in ( ) refer to the arrow indicators on the figures.

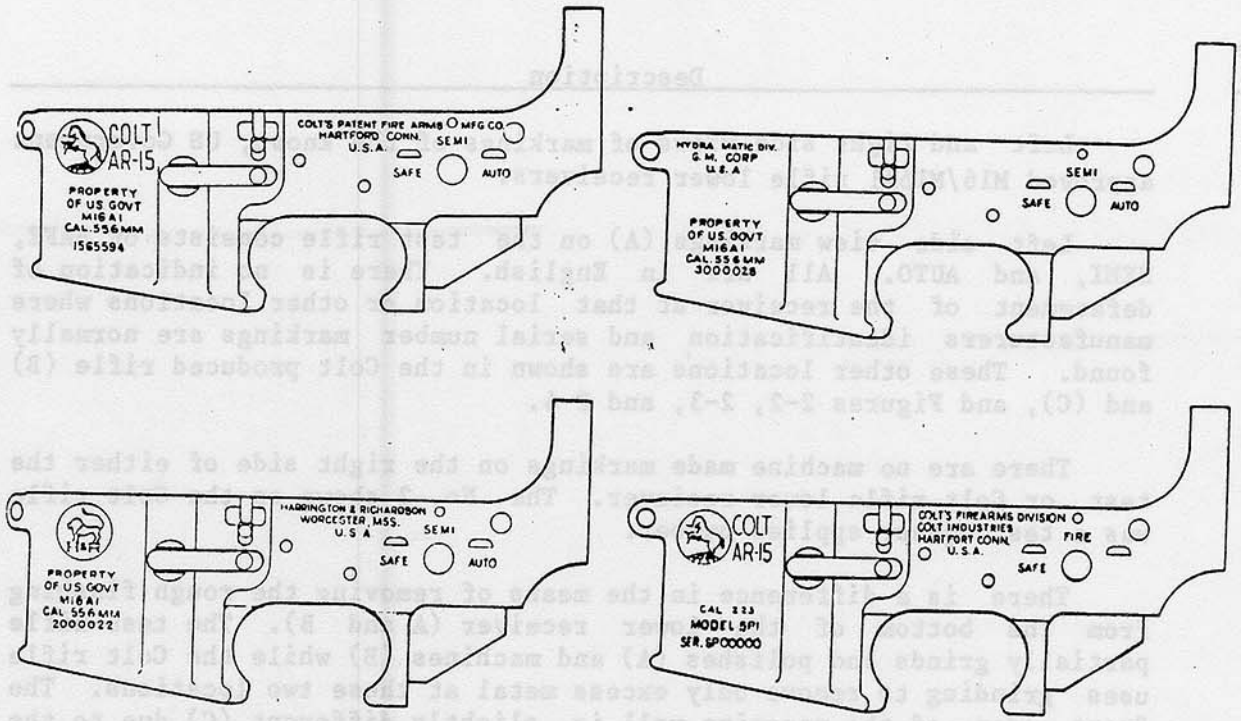


Figure 2-2. Left side view of M16A1 rifle lower receiver markings for Colt (upper left), General Motors Corp. (upper right), and Harrington & Richardson (lower left). Colt Commercial Sales (semiautomatic fire) is at lower right.

Figure 2-3. Left side view of M16A1 Rile lower receiver markings for Chartered Industries of Singapore, Ltd.

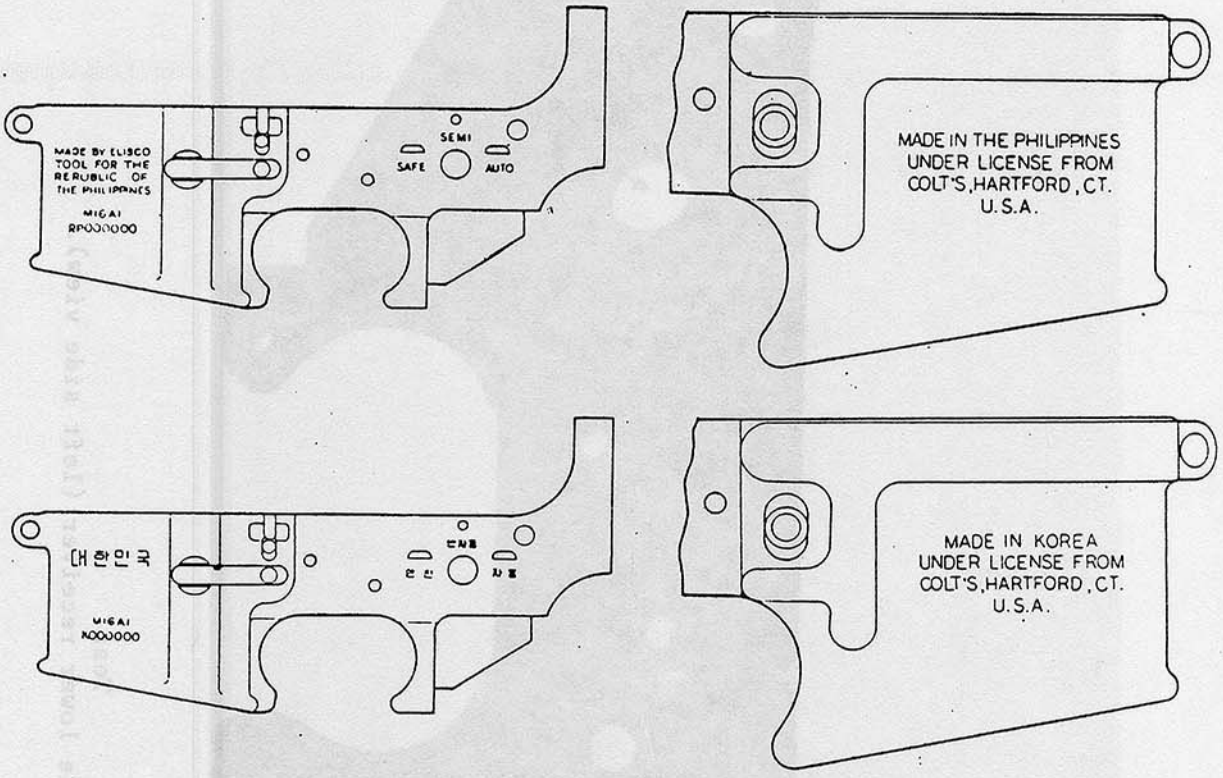
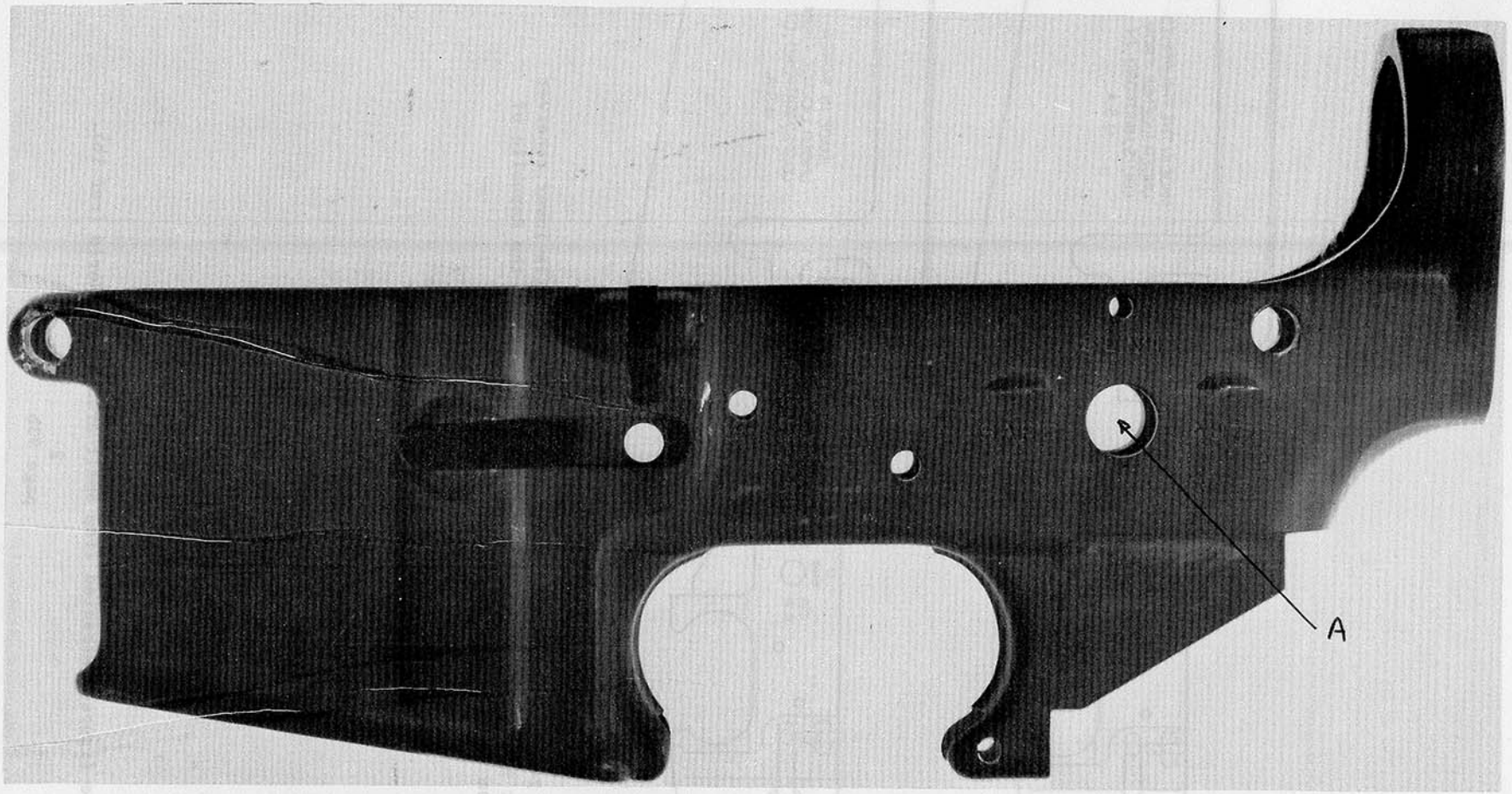


Figure 2-4. Left and right side views of M16A1 Rifle lower receiver markings for ELISCO tool (Philippines) (top views), and the Republic of Korea (bottom views).

Note: Above figures extracted from Small Arms of the World (ref 1b).



Test
Figure 2-68. Test rifle lower receiver (left side view).

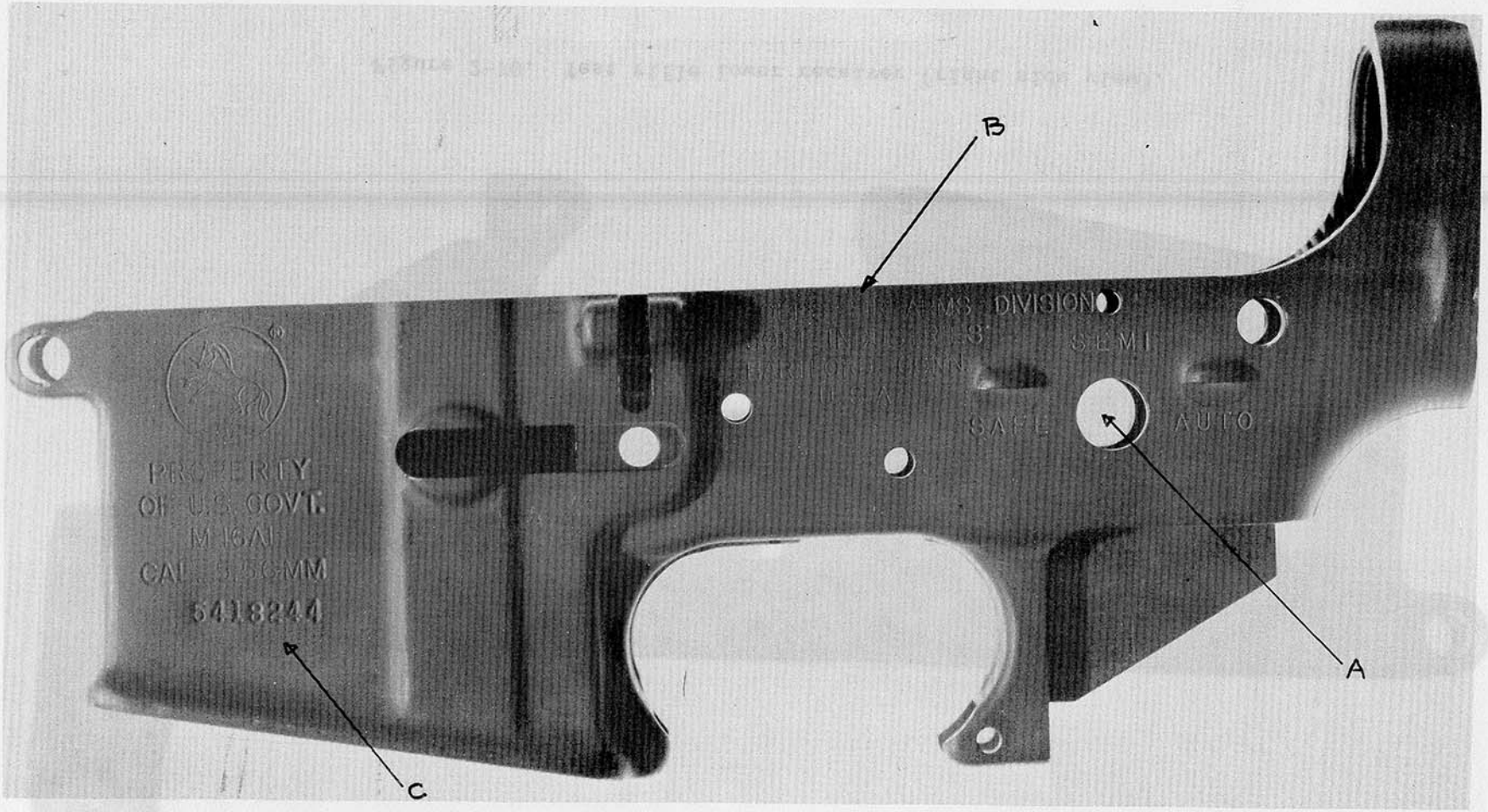


Figure 2-69. Colt M16A1 rifle SN 6418244 lower receiver (left side view).

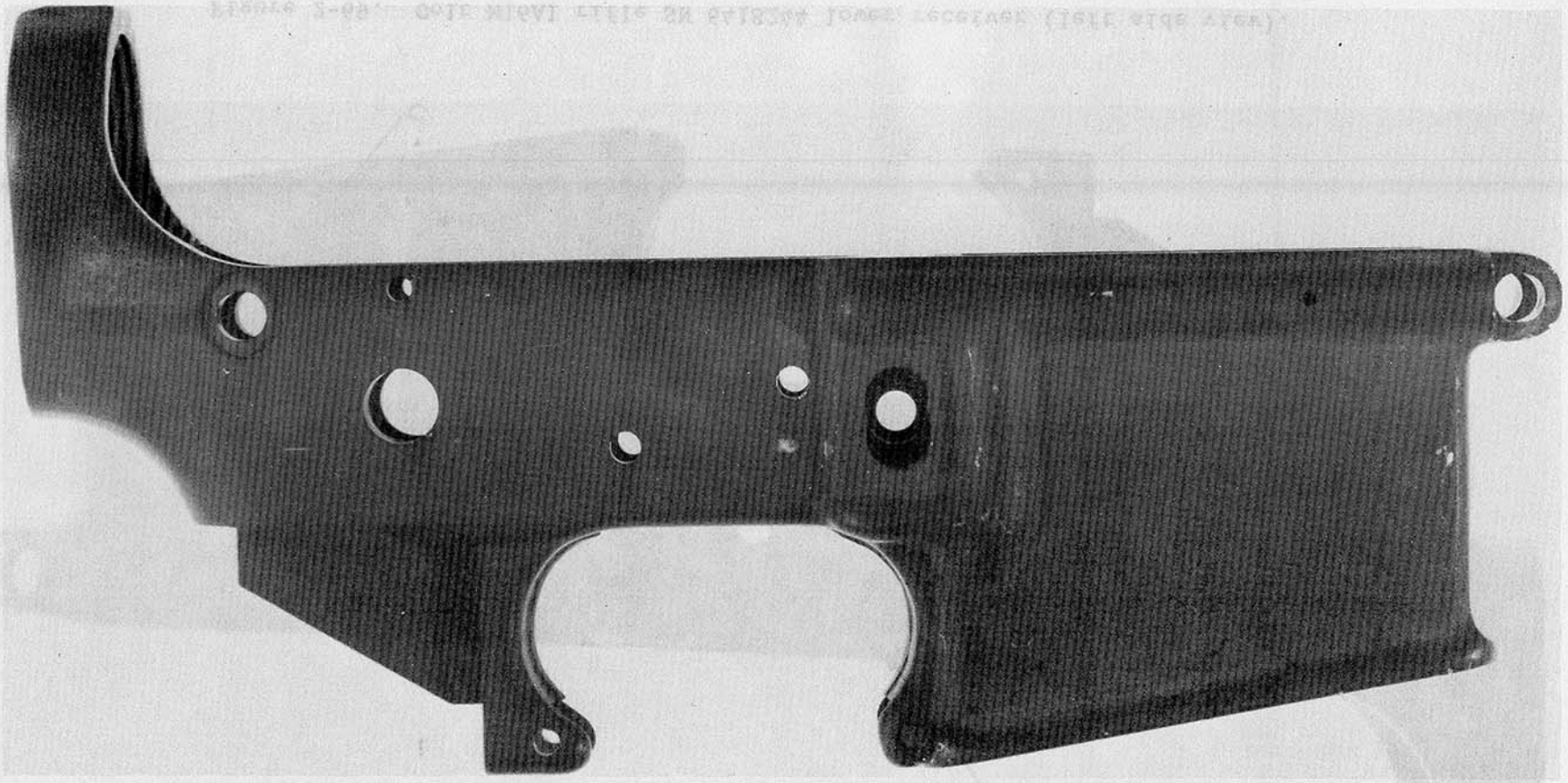


Figure 2-70. Test rifle lower receiver (right side view).

Control

Figure 2-71. Colt M16A1 rifle SN 6418244 lower receiver (right side view). Note: The No. 2 marked on magazine well is an Aberdeen Proving Ground marking only. It was added after receipt of the rile.