G41 Technical Specifications

According to two G41 brochures produced by the H&K Defence Technology Division, the first undated and the latter dated 1982, the technical specifications of the G41 were as follows:

Length: . . . . . 997mm (39.25")
Length of barrel including
flash hider: . . . . . 480mm (18.9")
Sight radius: . . . . . 566mm (22.28")
Weight, complete: . . . . . 3.6kp (7.94 lbs)
Rifling twist: 1 turn in 178mm (7"), right hand
No of "grooves": 6
. . . . . (listed as 4 in the 1982 brochure)
Internal rifling profile: . . . . . polygonal
Modes of fire: . . . single-fire, 3-round burst,
. . . . . sustained fire
Theoretical rate of fire: . . . . . 850 rpm

Later G41A1 - A3 and G41K Technical Specifications

According to an even later brochure, issued in 1984, the G41 had by then been made available in a total of six models, as follows:

- G41 rifle with fixed buttstock, twist 178mm (7.0")
- G41 rifle with ZF 4x24 telescopic sight
- G41A1 rifle with fixed buttstock, twist 305mm (12")
- G41A2 rifle with retractable buttstock, twist 178mm (7.0")
- G41A3 rifle with retractable buttstock, twist 305mm (12")
- G41K rifle with retractable buttstock

Additional specifications given in the 1984 brochure for the various models of the fixed-stock G41 available in one of two rifling pitches designed for use with either the early M193 or the later NATO-standard M855 cartridge) and the short-barrelled G41K, which was available only with the retractable buttstock, read as follows:

Rifling lengths: . . . . . 178mm (7")
. . . . . 305mm (12")
Bore profile: . . . . . 6-sided polygon
Muzzle velocity (V_o), G41:
Bullet weight 4.0g (NATO): 920m/s (3,018 fps)
Bullet weight 3.5g (M193): . 950m/s 3,117 fps)
Muzzle velocity (V_o), G41K:
Bullet weight 4.0g (NATO): 880m/s (2,887 fps)
Bullet weight 3.5g (M193): . 910m/s 2,986 fps)
Weight of G41, unloaded:
with fixed buttstock: . . . . . 4.1kg (9.03 lbs)
with retractable buttstock: . . . 4.4kg (9.7 lbs)
Weight of G41K, unloaded:
with retractable buttstock: . . 4.3kg (9.48 lbs)
Lengths, G41:
with fixed buttstock: . . . . . 997mm (39.25")
with retracted buttstock: . . . 800mm (31.49")
with extended buttstock: . . 985mm (38.78")
Lengths, G41K:
with retracted buttstock: . . . 740mm (29.13")
with extended buttstock: . . 930mm (36.61")
Barrel lengths, less flash suppressor:
G41: . . . . . 450mm (17.72")
G41K: . . . . . 380mm (14.96")

The G41: Too Little, Too Late

During this period H&K had set its sights determinedly on the revolutionary G11 rifle and its 4.7x32mm caseless cartridge as representing a completely new generation of military small arms, so advanced that it would sweep all the competition aside as soon as it was perfected and introduced. To this end the H&K design department was concentrating almost exclusively on the last few reliability and knock-off problems which were dogging the G11.

Consequently when other nations, such as Sweden and Italy, had approached H&K with a requirement for a new rifle shortly after the 5.56mm NATO cartridge had been adopted, nothing was available.

The adoption and manufacture of the G3 as the Ak 4 by the Swedish military is discussed in Chapter Twenty-four. By the 1980s the Swedish Ak 4s were coming to the end of their useful life and, in the light of the adoption by NATO of the 5.56x45mm cartridge, were in any case in the wrong calibre. The Swedes had the funding but needed a new rifle quickly, as military spending budgets, once allocated, have to be spent, or they will be reduced in the following fiscal periods. They intimated that they

would be happy to stay with H&K rather than looking elsewhere to sign a new agreement, but in the end the 5.56mm alternative H&K offered, the G41, did not impress them and they adopted the FNC.

H&K arranged a "marriage of convenience" with the arms firm Luigi Franchi SpA of Brescia, Italy to assemble the G41 and present it as a contender in trials for the new Italian rifle, but Beretta was a powerful political force in Italy, and so the G41 lost out again.

In the end the G41 was never adopted anywhere, and the programme was discontinued after only a few thousand trials rifles had been manufactured.

448 (right). The cover of a brochure produced by the *Divisione Sistemi Defensivi* of Luigi Franchi SpA of Brescia, Italy, depicting and describing the G41 rifle as assembled in Italy. courtesy the late Dr Edward C Ezell

H&K's "Group III": Weapons in 7.62x39mm

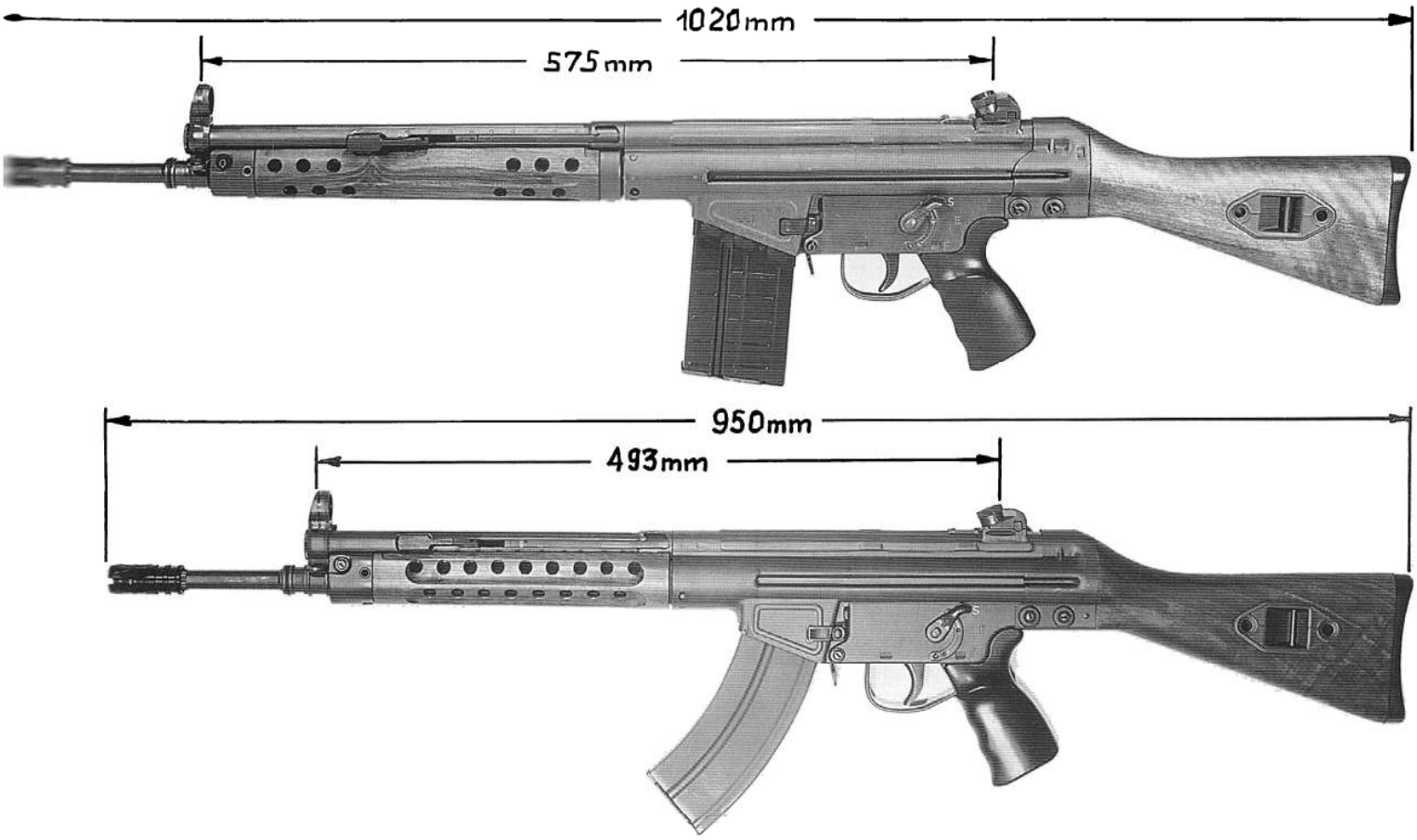
The First H&K in 7.62x39mm: the G3/1 of 1961

H&K introduced the short-lived G3/1 as an offshoot of the standard G3 in August, 1961, still featuring the roller lock action but redimensioned for the 7.62x39mm Bloc cartridge.

A Technical Comparison: G3 and G3/1

The following is excerpted from a comparison of technical data which appeared in a typewritten brochure titled *Das automatische Gewehr G3/1, Kaliber 7,62 x 39*, dated August 31, 1961:

	G3/1	G3
Calibre:	7.62x39mm	7.62x51mm
Length, with flash hider:	950mm (37.4")	1,020mm (40")
Barrel length:	400mm (15.8")	450mm (17.7")
Sight radius:	493mm (19.4")	575mm (22.6")
Weight, without magazine:	3.5kg (7.7 lbs)	3.95kg (8.7 lbs)
Weight of steel magazine, empty:	.21kg (.46 lb)	.28kg (.62 lb)
Weight of steel magazine, full:	.75kg (1.65 lbs)	.76kg (1.68 lbs)
Magazine capacity:	30 rounds	20 rounds
Muzzle velocity (V_o):	770 - 790m/sec	780 - 800m/sec
Theoretical rate of fire:	550 - 600 rpm	550 - 600 rpm
Muzzle energy (E_o):	240 to 250mkp	290 to 300 mkp



449. Left side views of two H&K rifles, with comparative dimensions drawn in, from a brochure dated August 31, 1961.

Above: the standard G3 of the day, featuring the familiar wood handguard and buttstock and aluminum magazine.

Below: a prototype of the shorter, lighter G3/1, chambered for the 7.62x39mm Bloc cartridge.

courtesy Walter Schmid

The H&K "Group III" of 1975

By 1975 the following weapons chambered for the 7.62x39mm Bloc cartridge were listed as "Group III" in the H&K "family":

- the HK32 automatic rifle
- the HK32K short automatic rifle
- the HK12 light machine gun
- the HK21A1 belt-fed machine gun

Except for the calibre and the more pronounced curve of the magazines, these arms resembled their 5.56mm counterparts very closely.

The HK32 Automatic Rifle

A total of 700 selective-fire HK32 rifles were produced during the late 1960s and early 1970s and delivered to certain German authorities "not named by H&K". It is assumed these rifles were for clandestine use in East Bloc countries by the *Fernspäher* (special combat reconnaissance teams of the *Bundeswehr*; *Fern* meaning "far away" and *spähen* meaning "to look").

A small number of HK32s also ended up in Tanzania. The Tanzanians supplied a quantity of

450. Left side closeup of HK32 serial no 012169, manufactured in September, 1969.
H&K collection, courtesy Dieter Rall

Chinese-made 7.62x39mm cartridges for use in testing in Oberndorf to ensure flawless performance before the weapons were shipped.

In addition, a few HK32s were also ordered by Qatar, for use by the police.

Chapter Twenty-two

The H&K 9mm Family

The Initial "Submachine Gun HK9", and the HK54 in Calibre "9mm Parabellum and .38"

The pistol-calibre submachine gun is the smallest member of the H&K weapons family. It utilises the same roller-lock action principle, fluted chamber and general "family" outline of the G3 rifle.

The pistol-calibre SMG, first introduced in July, 1964, was initially known as the HK9. By March 1, 1965, this designation had been changed to HK54, in order to conform to the coding system described in Chapter Twenty.

Interestingly, while it might appear that the HK54 was offered in two chamberings, "9mm Parabellum and .38", this was in deference to potential customers in the USA, where it was assumed that both terms were used to refer to the standard 9x19mm Parabellum cartridge.

H&K's rationale for the introduction of the SMG was given as follows:

> *. . Our experience and practice with the Automatic Rifle G3 have been taken as a basis when designing the Submachine Gun HK54, Cal 9mm Parabellum and .38.*
>
> *Both weapons are a part of the HK-weapon-system based on the manifold proven function-, bolt- and manufacturing principles of the rifle G3 . .*

The 9mm Family Proliferates . .

The Short-Lived HK "MP64"

51. Left side views of two H&K products, taken from the HK9 brochure dated July, 1964.

Above: an unserialled G3, manufactured in June, 1963. The aluminum magazine is marked "G3 HK 6/63 12-27-7057", these being the last three sets of numbers in the NSN.

Below: one of the very first prototypes of the HK "MP 64", unserialled, manufactured in July, 1964. Note the early front and rear sights, and the early retractable buttstock.

courtesy Walter Schmid

452. Left side view of the HK64 prototype, stripped.

Note the early semi-finned barrel, early sights, and the initial magazine configuration.

The numbered component groups are identified in the July, 1964 brochure titled *Maschinen-Pistole HK 9* and in the later 1965 English-language brochure "Submachine Gun HK54 Cal. 9mm Parabellum and .38" as follows:

1. Receiver with barrel, loading mechanism and sights
2. Bolt
3. Grip with trigger assembly
4. Retractable stock
5. Forearm
6. Magazine

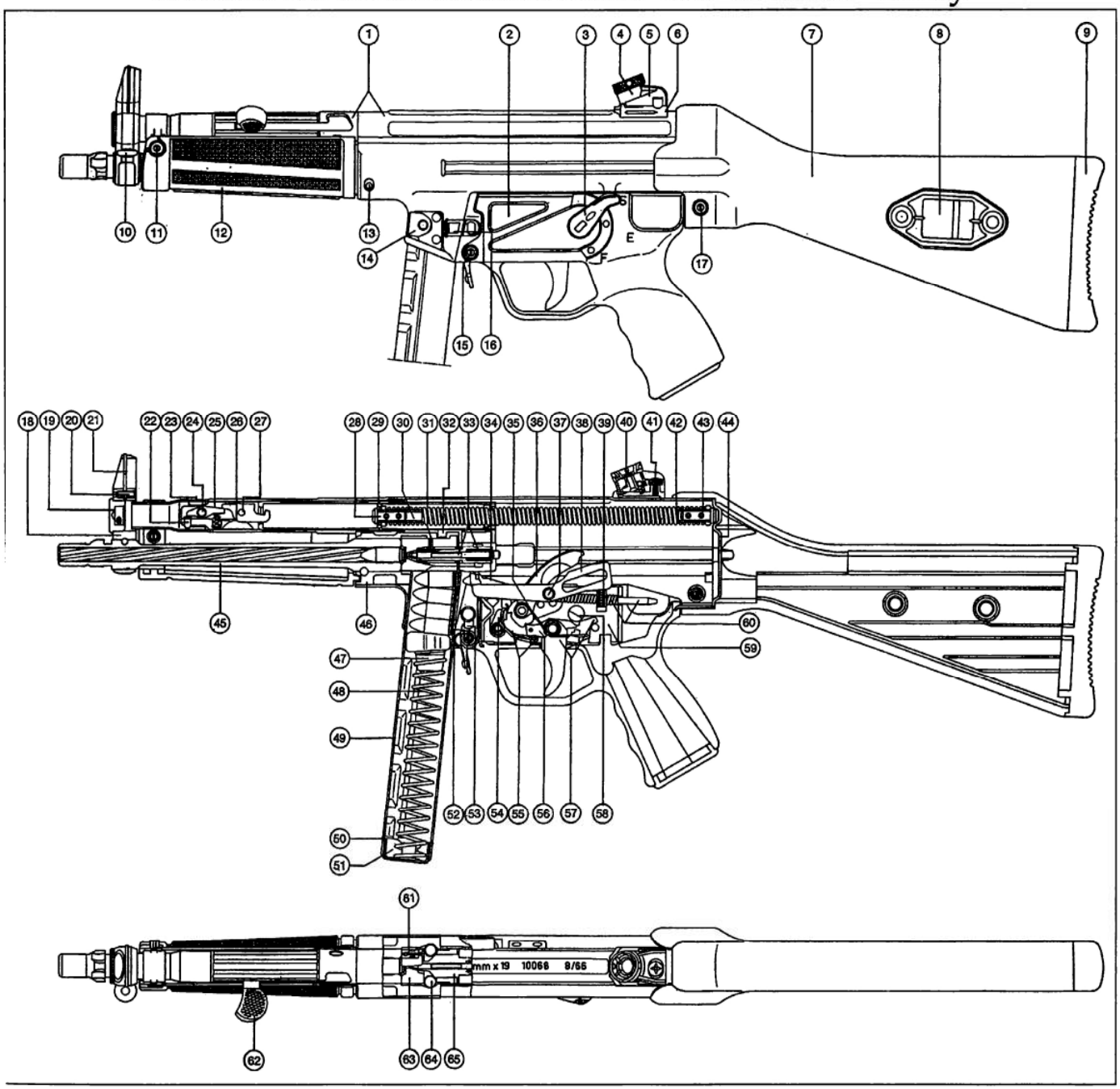
courtesy the late Warren Odegard

453. Left side view of a slightly later version of the MP64, manufactured in November, 1964.

Compare with the above: note the addition of an integral muzzle brake, and the redesigned sights. The rear sight has also been relocated to the rear of the receiver. Both the magazine and the configuration of the buttplate on the retractable stock have also been modified.

courtesy the late Warren Odegard

The HK MP5 Submachine Gun: "120 Variants" Today



454. Left side and top views of the HK MP5. According to the markings on the top view, below, this is serial no 10068 manufactured in August, 1966, but the chart itself is dated July, 1968. The numbered components are named in fig 455.

The SMG diopter rear sight is slightly different from the sight fitted to the rifle versions. The trajectory of the 9x19mm Parabellum cartridge is the same at 25 and 100 metres, and the maximum trajectory at 60 metres is approximately 11cm (4 1/3"). Elevation markings are therefore not required. The four diopter holes are of different sizes simply so the operator may select the one providing the best eye relief.

Note the positive bolt closure components on this early model (part nos 24 - 27) in the centre sectioned view.

courtesy the late Dr Edward C Ezell

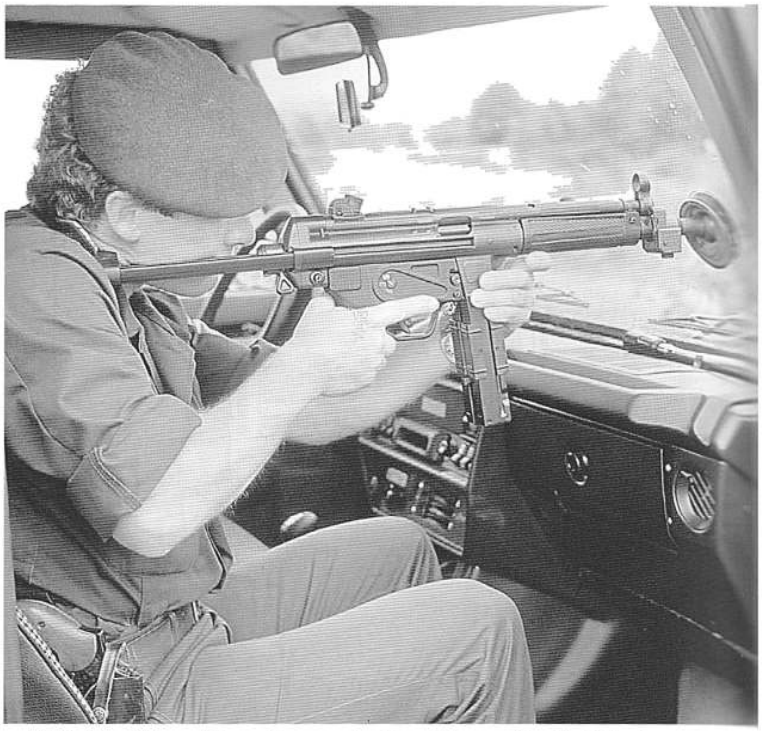
The early versions soon gave way to a range of submachine guns which were assigned the official German government designation "MP5". A number of MP5 models remain in the H&K catalogue today in various iterations fitted with a variety of fixed, folding, and retractable buttstocks, or simply a receiver cap; several forearm and sight mount variations; standard and ultra-short barrel versions (the

1 Receiver with operating lever housing
2 Grip assembly
3 Safety catch
4 Rotary rear sight
5 Sight support
6 Sight base
7 Butt stock
8 Sling holder
9 Butt plate
10 Eyebolt
11 Locking pin for handguard
12 Handguard
13 Cylindrical pin
14 Hook
15 Locking pin for grip assembly
16 Magazine catch
17 Locking pin for butt stock
18 Frontsight holder
19 Cap
20 Clamping sleeve for frontsight
21 Frontsight
22 Catch bolt
23 Stop ring
24 Rivet for catch lever
25 Catch lever
26 Catch spring
27 Axle for operating handle
28 Stop pin for recoil spring
29 Guide ring
30 Recoil spring guide rod
31 Clamping sleeve
32 Bolt body
33 Firing pin with firing pin spring
34 Release lever
35 Elbow spring for trigger
36 Hammer
37 Ejector spindle
38 Ejector
39 Ejector pressure spring
40 Screw socket with rivet
41 Binding screw with locking washer
42 Recoil spring
43 Rivet
44 Bottom plate
45 Barrel
46 Barrel extension
47 Follower
48 Follower spring
49 Magazine tube
50 Magazine floor plate
51 Safety cup with guide bush
52 Magazine catch lever with roller
53 Transmitting piece for magazine catch
54 Catch
55 Elbow spring with roller
56 Sear
57 Trigger
58 Safety pin
59 Trigger housing
60 Pressure shank und pressure spring
61 Extractor with extractor spring
62 Operating handle
63 Bolt head
64 Locking roller
65 Locking piece

455 (left). The nomenclature list for the numbered components of the MP5 as shown in fig 454.

As mentioned, the components of the short-lived positive bolt closure device are numbered 24 - 27.

courtesy the late Dr Edward C Ezell



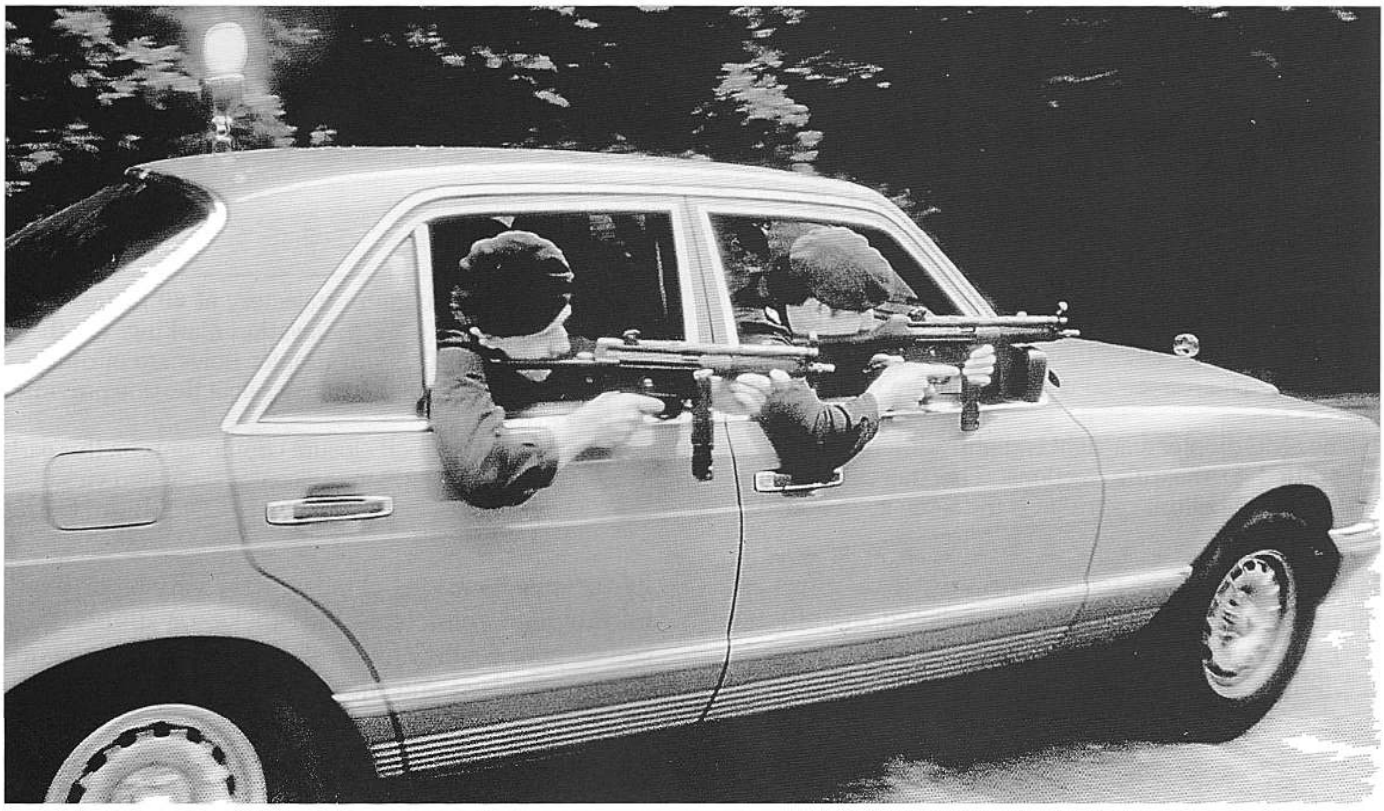
456. A police officer demonstrating the method of deploying the MP5, with retractable stock open, through a special windshield aperture, for use against fleeing felons.

Note the two 30-round magazines, side-by-side in the H&K accessory magazine clip.

courtesy the late Dr Edward C Ezell

457 (below). A further police demonstration of MP5 employment from a vehicle against fleeing felons. The officer in front has a fixed-stock version, while the rear gun is fitted with a retractable stock.

courtesy the late Dr Edward C ezell



458. Three early versions of the silenced MP5. Later models were fitted with ribbed handguards for better insulation against heat.

Above: the MP5SD2. with fixed plastic stock.

Centre: the MP5SD3 with retractable stock.

Below: the MP5SD1 RC (receiver cap) with rear-mounted sling swivel.

courtesy the late Dr Edward C Ezell

MP5K) plus several silenced versions (the MP5SDs). In addition, a choice of trigger mechanisms are available which provide standard selective semi- and full automatic fire, the addition of a three-round burst feature, or an optional 0-1-2 trigger group which includes an "automatic double-tap" two-round burst capability.

The popularity of the MP5 is described in a recent H&K catalogue titled "Weapon System, Military and Law Enforcement" as follows:

459. Left side view of the ultra-short HK MP5K, fitted with a forward hand grip and a 20-shot magazine. Weight: 4.4 lbs (2kg) with receiver cap; length: 12.80" (325mm); sight radius 10.25" (260mm); barrel length 4.5" (115mm).

The sighting arrangement of this model is described as consisting of "a fixed front sight and an adjustable open rotary rear sight with various aperture widths which can be selected to suit individual requirements."

Another model, the MP5KA1, is similar but is fitted with "a non-adjustable sighting arrangement consisting of a blade front sight and a non-adjustable open square-notch rear sight" on the top of the receiver.

courtesy the late Dr Edward C Ezell

. . Heckler & Koch MP5 submachine guns employ the same delayed blowback operated roller-locked bolt system found in the famous HK G3 automatic rifle [which, ironically, is conspicuously absent in the latest H&K catalogues] . . Firing from the closed-bolt position during all modes of fire makes MP5 submachine guns extremely accurate and controllable.

Used by military and law enforcement units in more than fifty nations, the MP5 is firmly established as the world's pre-eminent submachine gun. Over 120 variants of the HK MP5 submachine gun are available to address the widest range of tactical requirements.

460. The *pièce de resistance* of the 9mm family: a late MP5K with four-position selector ingeniously clamped inside a normal-looking briefcase by means of a modified telescopic sight mount (all MP5s have integral bases formed on the receivers, and are thus capable of being fitted with optical and other enhanced sight systems).

Left: side view of the briefcase, showing rubber plug over firing aperture.

Centre and right: the briefcase open showing safety button and trigger built into handle, above, and MP5 with curved 30-round magazine inside, together with the optional cleaning kit affixed to a bracket.

A spare magazine is bracketed into the open lid, below.

courtesy Dieter Rall, H&K GmbH

Chapter Twenty-three

Short Lives and Experiments

Introduction

Over the years H&K has produced a number of experimental designs based on the standard roller-lock mechanism which, for one reason or another, did not make it into series production. Some of these are discussed below, in ascending order of calibre.

The HK36 4.6x36mm Assault Rifle

The Rationale for the HK36

An H&K brochure titled "Technical Information on the New Infantry Weapons System - HK36 Assault Rifle - Cal 4.6mm x 36: Stage of Development, January, 1971" was the source of an article describing the HK36 written by the recognised British small arms authority Major F W A Hobart, which appeared in the January-February, 1975 issue of the prestigious US periodical *National Defense*.

This article, which paraphrases many of the statements in the H&K brochure, is excerpted as follows:

The HK36 Assault Rifle

The 4.6mm Heckler & Koch HK36 assault rifle represents an approach to the next generation of rifles to succeed the current weapons based on the 5.56x45mm cartridge. The designer was Herr Mueller, and his weapon was based broadly on the following requisites:

1. *A reduced-impulse cartridge providing small muzzle momentum and a straight-through action which, with the low impulse, would produce a negligible turning moment [at] the muzzle. This would allow the soldier to control the weapon [in] automatic fire.*
2. *Reduced combat weight [and] a realistic quantity of ammunition for a combat situation that might prevent immediate resupply . .*
3. *An effective range of 300 meters. This would permit a substantial reduction in the mass of the bullet and so contribute to the reduced muzzle impulse.*
4. *A flat trajectory which would reduce the height of the mid-range ordinate and allow a single sight setting [which] would eliminate range-finding errors.*
5. *A high chance of a hit due to the combination of the reduced recoil energy provided by the low muzzle impulse, the flat trajectory, and a burst-fire control producing three rounds for a single trigger operation. These three rounds would be fired at a high cyclic rate calculated to produce the minimum angular deviation at the muzzle.*
6. *Target effectiveness optimized by producing one bullet with a high chance of incapacitation of the lightly protected soldier and another bullet with an ability to penetrate cover and armored targets.*

461. Left side view of a late prototype of the HK36 4.6x36mm assault rifle. Its unusual features are discussed in the text. courtesy the late Dr Edward C Ezell

The antipersonnel bullet would achieve its end by utilizing a new design of nose calculated to produce maximum tumbling within the target, while maintaining complete stability in flight due to a high sectional density and an adequate rotational velocity . . All modern small-caliber bullets become unstable and tumble on entering any medium denser than air. The unusual point on the HK36 bullet causes this tumbling to occur more quickly . . The hard-nosed bullet would achieve success by using a high-density tungsten-carbide core.

The HK36 is a rifle of distinctive appearance [fig 461]. The receiver, pistol grip, and butt stock are plastic-covered, and the carrying handle incorporates the sight unit. The butt stock [of the original prototype] is of the telescopic retracting type . .

The magazine is of original design. It consists of a metal box permanently mounted below the receiver. The ammunition is supplied in a 30-round wraparound box with neither top nor bottom, and is kept in this container by a tape.

The magazine . . is charged as follows:

At the bottom on each side is a milled button attached to a spring-loaded chain carried inside the magazine. When the buttons are pulled down, the chain is extended and held out. This pulls down the magazine platform and compresses the magazine spring. The rear of the magazine is open, and the 30-round box is placed on top of the followers. A further pull on the chain releases the holding catch.

The magazine platform rises under the cartridges and passes inside the containing box. The chain is taken up into the magazine. The first round is now positioned for loading, and when the bolt comes forward the top cartridge is fed into the chamber. The magazine is sealed against the entry of dirt, snow, etc. As subsequent rounds are fired the magazine spring drives the follower farther up inside the ammunition box. When the last round is fired, the bolt is held open. When the chain is pulled down, the empty box is ejected, the magazine spring is fully compressed, and the platform is pulled down to allow the next ammunition pack to be inserted.

This system is claimed to reduce weight and cost. The ammunition is in factory-packaged light alloy boxes which are expendable in time of war. No dirt can reach the ammunition before loading.

The weapon is fitted with a reflex sight for daylight use, and a beta light is used for conditions of poor visibility at dusk and dawn.

The HK36 uses the roller system of delay[ed] blowback utilized in all Heckler & Koch rifles and machine guns . .

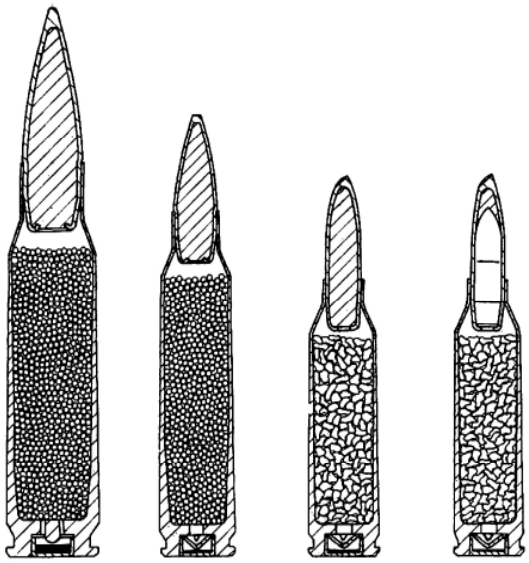
Describing the HK36

The original 1971 H&K brochure also mentions a few other salient points, such as the fact that the HK36 features "single fire, automatic fire, controlled bursts of from 2 to 5 rounds"; the sighting is flat to 300 metres "without range setting"; and that in total weight, the "G3 assault rifle with 100 rounds in magazines corresponds to the HK36 assault rifle with 500 rounds in magazines".

The brochure also contains the following specifications describing the HK36 and its unconventional cartridge:

Specifications of the HK36 Assault Rifle

Rate of fire, theoretical	1,100 to 1,200 rpm
Length, buttstock extended	35.0"
Length, buttstock retracted	30.3"
Height, including feed unit	7.7"
Length of barrel, without flash hider	15.0"
Weight of weapon with feed unit	6.3 lbs
Weight with 90 rounds	8.1 lbs
Length of barrel:	15.7"
Length/direction of twist	6.3"/right
Groove diameter	0.185"
Land diameter	0.180"
No of grooves	6
Bolt recoil to buffer	3.30"
Bolt recoil to rear of cartridge base	2.90"
Recoil energy	0.17 lb/ft
Recoil momentum	0.88 lb/sec



	7.62 mm x 51	5.56 mm x 45	4.6 mm x 36 soft-core	4.6 mm x 36 hard-core
Calibre	7.62 mm	5.56 mm	4.56 mm	4.56 mm
Cartridge weight	0.85 oz	0.39 oz	0.27 oz	0.30 oz
Bullet weight	143.5 gr	55.6 gr	41.7 gr	54.0 gr
Cartridge length	2.79 in	2.26 in	1.95 in	1.95 in
Case length	51 mm	45 mm	36 mm	36 mm
Muzzle velocity	2,756 fps	3,215 fps	2,789 fps	2,559 fps
Muzzle energy	225 lb/ft	73 lb/ft	67 lb/ft	74 lb/ft
Spec. muzzle energy	11,398 lbsyd/sq.in	10,201 lbsyd/sq.in	9,330 lbsyd/sq.in	10,135 lbsyd/sq.in
Muzzle momentum	1.96 lbsec	0.88 lbsec	0.51 lbsec	0.62 lbsec
Velocity at 300 m	2,090 fps	2,133 fps	1,650 fps	1,654 fps
Energy at 300 m	129.0 lb/ft	51.7 lb/ft	23.5 lb/ft	30.2 lb/ft
Spec. energy at 300 m	6,531 lbsyd/sq.in	4,929 lbsyd/sq.in	3,297 lbsyd/sq.in	4,214 lbsyd/sq.in

462. A chart from the H&K brochure titled "Technical Information on the New Infantry Weapons System - HK36 Assault Rifle - Cal 4.6mm x 36: Stage of Development, January, 1971", comparing the specifications of four actual-size cartridges: 7.62mm NATO, 5.56mm NATO, and the two versions of the H&K 4.6x36mm HK36 round.
courtesy the late Dr Edward C Ezell

The HK53 5.56mm MICV Supplemental Weapon

During the early 1970s, shortly after the outset of what was to become the decade-long SAW programme, H&K's then US representatives Security Arms Co (SACO) of Arlington, Virginia produced a lengthy report titled "Heckler & Koch Outline of Capabilities", wherein the proposed "HK53 Mechanized Infantry Combat Vehicle (MICV) Supplemental Weapon (MICV-SW)" was described as follows:

. . This weapon will be employed in the new US Army MICV, which is destined to replace the present US Army M113 Armored Personnel Carrier. Since the M16 rifle is too long to be fired from the interior of the MICV, the US Army has a requirement for an off-the-shelf production model short 5.56mm machine carbine with a high sustained rate-of-fire capability. The HK53 MICV-SW fulfills all US Army requirements and is a strong contender for final selection and adoption as the US

463. Left side view of the HK53 Mechanized Infantry Combat Vehicle Supplemental Weapon (MICV-SW), serial no 10318, manufactured in November, 1973.

Note the robust barrel, the interrupted-thread type bracket on the front of the barrel jacket tube for attachment to the vehicle, the quick-change barrel levers above and below the barrel jacket, the empty shell catcher behind the receiver, and the absence of sights. courtesy the late Dr Edward C Ezell

464. Left side view of the HK53 MICV, stripped into major component groups.

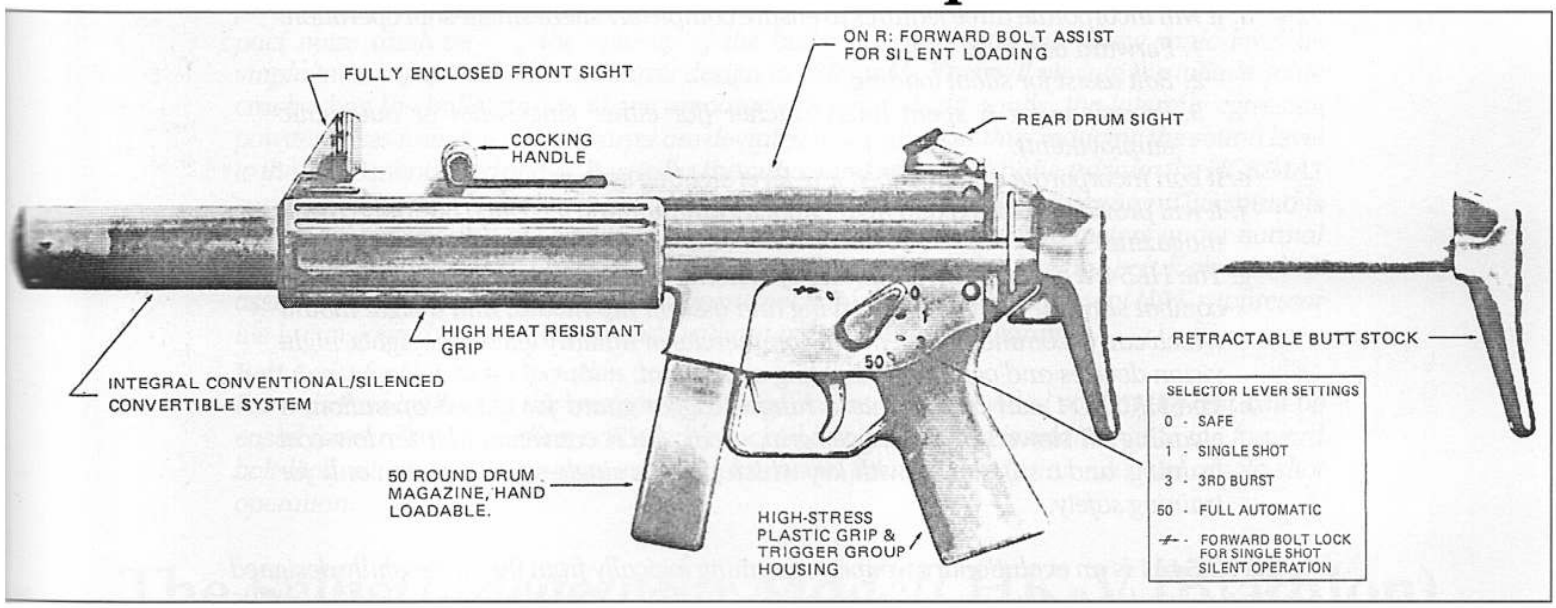
Note the extra-short return spring guide tube, and the special cocking device on top of the receiver behind the upper QCB release. courtesy the late Dr Edward C Ezell

Army standard MICV-SW system. The US Army Materiel Command will initiate testing of the HK53 MICV-SW by mid-1973 with engineering and Service tests scheduled through the remainder of the year. Final Service selection is scheduled for early 1974.

The HK53 MICV-SW [figs 463 and 464] features the following characteristics:

Caliber:	*5.56mm x 45 (.223)*
Operating Principle:	*Delayed roller-locked bolt, blow-back operated. Fires from open bolt.*
Type of Fire:	*Semi and Full Automatic*
Rate of Fire:	*650 spm*
Feed:	*30 or 40 round magazine. (Weapon will feature spent-brass catcher bag on ejection port).*
Weight:	*6.2 lb*
Length:	*24.02" (with flash hider)*
Quick Barrel Change:	*The HK53 MICV-SW will be fitted with a quick change barrel to ensure operational readiness under all combat conditions.*
Sustained Fire Capability:	*The HK53 MICV-SW will be capable of maintaining a sustained fire rate of 50 - 70 rounds per minute for a total of 15 minutes.*

The HK54A1 "Product Improved" SMG



465. Left side view of the proposed HK54A1 "Product Improved" SMG, with special features indicated.

Note the five-position selector, the settings for which include a "forward bolt lock for single shot silent operation". This drawing is taken from the July 7, 1980 H&K prospectus for a Joint Services Submachine Gun, excerpted in the text. courtesy the late Dr Edward C Ezell

In 1980, in response to a request from US military authorities for a Joint Services Submachine Gun, H&K Inc of Virginia, in partnership with the German parent firm H&K GmbH, developed an interesting proposal which is excepted as follows:

Proposal for Advanced Design/Development and Fabrication of a Product Improved Submachine Gun

July 7, 1980

The HK54A1, calibre 9x19 Parabellum NATO, Submachine Gun will be a delayed blow-back operated submachine gun with positive delayed roller-locked bolt action. The gun will fire from the closed bolt at a rate of approximately 800 rounds per minute. It will be fitted with a positive safety, forward bolt lock. single fire, full automatic, and 3-round burst trigger

mechansim which will permit controlled fire at over 1,000 spm. The gun will weigh 7 pounds complete with drum magazine, incorporate an 8" barrel with polygon boring. Muzzle velocities will be approximately 1,300 fps conventional mode; approximately 935 fps silenced. The weapon will be fitted with a retractable buttstock. Approximate dimensions will be:

length, butt-stock retracted: . . . . . 21"
length, butt-stock extended: . . . . . 29"
height with or without drum magazine: . . . . . 8"
widths:
with drum magazine: . . . . . 3.5"
without drum magazine: . . . . . 2.3"

The HK54A1 will advance the state of the art because:

a. *It will incorporate a completely integral silenced fully convertible system which can instantly be switched from the conventional to the silenced mode.*
b. *It provides high-volume, accurate burst fire by the incorporation of a 3-round burst selector with a rate of fire in excess of 1,000 spm.*
c. *It will incorporate new and modernised design principles to ensure maximum controllability and one-handed operation.*
d. *It will incorporate three features to ensure completely silent single-shot operation:*
    1. *Forward bolt lock.*
    2. *Bolt assist for silent loading.*
    3. *Provisions for a spent brass catcher (for either single-shot or automatic employment).*
e. *It can incorporate an advanced low-level sighting system.*
f. *It will provide protected and high-capacity ammunition feed for a 50-round drum magazine.*
g. *The HK54A1 will feature a number of systems-designed accessories to include a combat sling for all types of carrying and assault fire modes; and a sight mount which can accommodate all major commercial or military telescopic sights, night vision devices and collimated sighting equipment.*
h. *The HK54A11 can incorporate a hinged trigger guard for gloved operation, a cleaning kit stowed in the trigger grip, a cal .22LR conversion kit for low-cost training, and a safety-lock with key which permits single-shot operation only for training safety.*

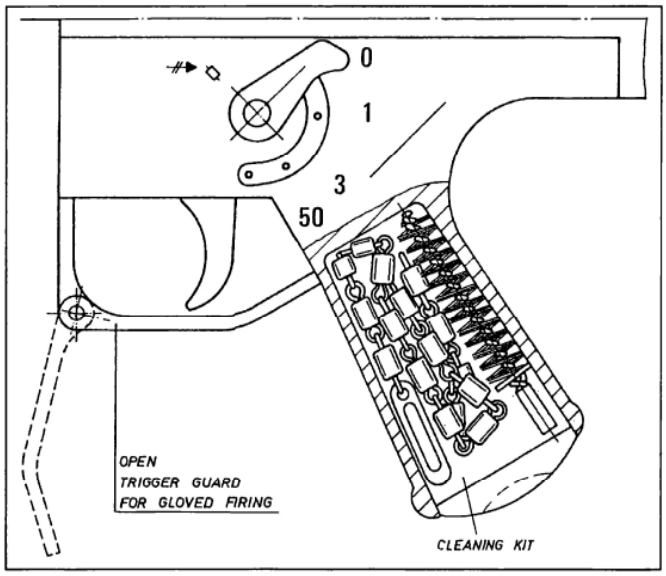
The HK54A1 is an evolutionary weapon stemming logically from the successfully designed production models and proven design concepts of Heckler & Koch's rugged and reliable MP5 submachine gun family. Specifically, it is an advanced product improvement of the MP5SD, 9mm, silenced submachine gun. The MP5SD is employed in operations by the following US Army units:

- *Special Forces Center & School*
- *5th Special Forces Group*
- *7th Special Forces Group*
- *1st Ranger Battalion*
- *2nd Ranger Battalion*

Thus, this proposal not only advances the state-of-the-art beyond existing submachine guns in its evolutionary design, but also it is a product improvement of a weapon presently standard in the US Army inventory . .

Silencer

The HK54A1 will be provided with a barrel/suppressor silencer unit which clicks-in to a conventional or silenced mode, thus providing a significant advantage over present SMG



466. Left side view of the pistol grip of the HK54A1, showing the five-position selector and the position of the hinged triggerguard for use while wearing gloves.
Note the cleaning kit, stowed in the hollow grip.
courtesy the late Dr Edward C Ezell

systems with snap-on or screw-on suppressors . . this feature will provide greater sound suppression, better balance of weapon, a shorter overall weapon length, more accurate and effective subsonic capability, improved maintenance, increased suppressor life, and finally no buildup of propellant gases which result in "first round sparkle". Also as noted above, this is the first submachine gun which will be developed with a completely integral conventional system convertible to a completely integral suppressed weapon . . The HK54A1 suppressor/silencer will reduce the standard 9mm NATO peak sound pressure levels by a minimum of 30 dB in the 1 - 20,000 Hertz range as measured one meter perpendicular to the muzzle with an impact noise analyzer . . the velocity of the bullet is reduced to just below sonic level by employment of special silencer/barrel design to 935 fps V_0. This will obviate the telltale sonic crack when the bullet passes above an observer's head. Additionally, the laterally egressing powder gases from the vented barrel are deviated in the silencer thus reducing the sound level to the 30 dB mentioned above. Basically, the only sound which can be heard from the HGK54A1 suppressed version is the basic mechanism function during recoil and loading. This sound is minimal however and not easily discerned at distances of over 20 - 30 meters under normal operating conditions . . In a single shot operation utilizing the forward bolt lock and bolt assist as described earlier, there would be no mechanim noise . . At present H&K suppressor life is considered to be 10,000 rounds without maintenance or cleaning.

Bolt Assist for Noiseless Operation

For noiseless loading of the weapon a forward bolt assist is provided so that the bolt can be eased forward while loading and silently locked into place. This is additional to the forward bolt-lock which would prevent mechanism noise from recoil during silenced single-shot operation.

The *Selbstladegewehr Modell* HK-V (Biathlon)

467. Left side view of the Biathlon version of the standard 7.62mm NATO calibre G3 serial no V 1193, produced in March, 1966.
Note the special sights, wood handguard, 10-round magazine, and plastic buttstock.
courtesy Walter Schmid

468. Left side closeup of H&K Biathlon rifle serial no V5/1212, produced in May, 1966.

Note the micrometer rear sight, attached to a special track on top of the receiver, and the five-round magazine.
courtesy Walter Schmid

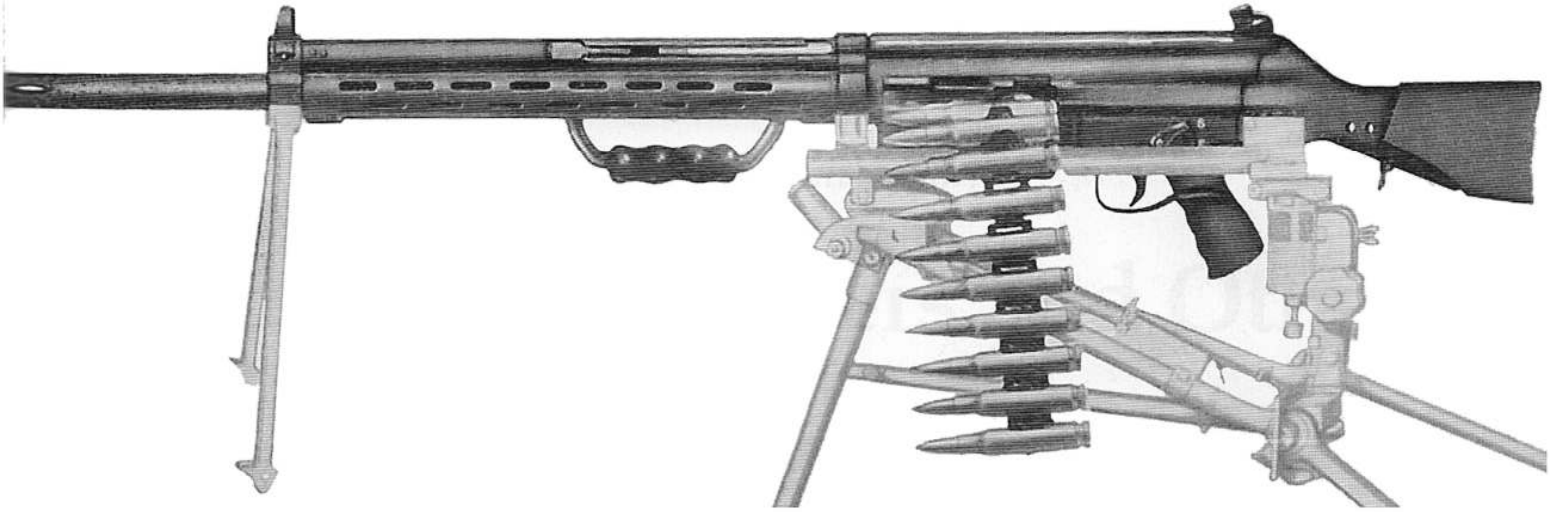
469. Right side closeup of the above Biathlon rifle, showing details of the *Freischwinger* handguard attachment and special front sight block. courtesy Walter Schmid

A special short run of a Biathlon version of the standard 7.62mm NATO calibre G3 was produced in 1966. This version was fitted with a long 500mm (20") barrel and a lengthened cocking tube, both ending in a block fitted with a redesigned hooded front sight, located at the extreme muzzle end for maximum sight radius.

No standard rear iron sight was provided, but rather the rifle was supplied with a high-quality commercial micrometer diopter sight, provided with click adjustments for windage and elevation, which attached to a track on top of the receiver.

According to H&K, less than twenty test samples of the HK-V Biathlon rifle were produced.

The .50 Calibre(!) HK25



470. Left side view of the elusive HK25 .50 calibre machine gun, mounted on a standard MG3 tripod. Note the massive bull barrel and the spring-assisted, recoil-absorbing buttstock.

The diopter rear sight is graduated from 200 to 800 metres. courtesy H&K GmbH

The .50 calibre HK25 project was extremely short-lived. According to Dieter Rall, the archivist at H&K's Oberndorf factory, only two prototypes of the HK25 ever existed, and neither was completely finished.

The single image of the HK25 which we have located is from an early H&K catalogue. This is reprinted here, along with the brief description which was provided:

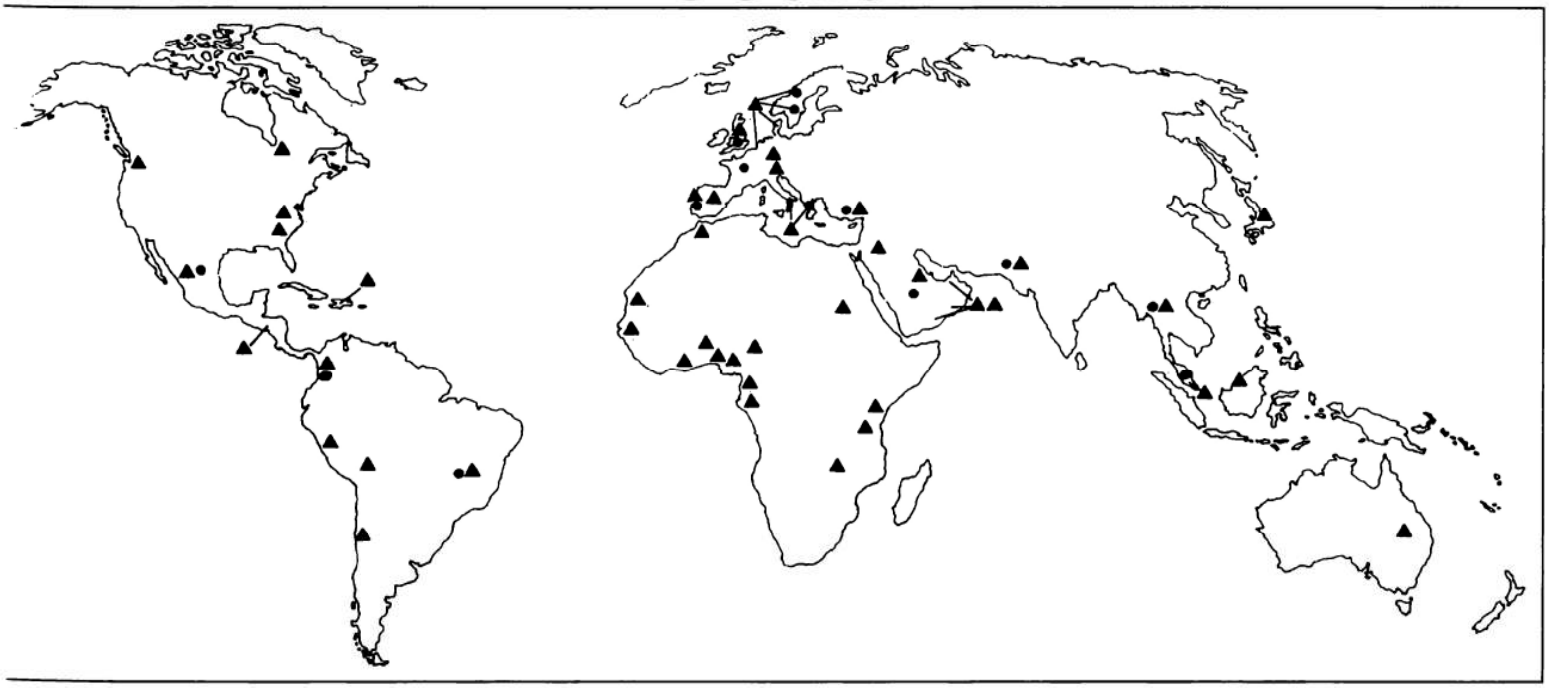
Technical Data, HK25

Calibre:	.50 (12.7x99mm)
Muzzle velocity (V_o):	approx 3,000 fps
Overall length:	55.11"
Line of sight:	39.4"
Barrel length:	35.43"
Weight (w/o magazine):	35.3 lbs
Cyclic rate:	approx 450 rpm
Feed device:	metallic link belt

Part VII: H&K Around the World

Chapter Twenty-four

Licensed Producers and Other Users



471. A representative map, showing the worldwide deployment of H&K weapons systems.
●: Licensing/Manufacturing Agreements and Operations
▲: Weapons employment. courtesy H&K, Inc

Countries Using Ready-Made Product

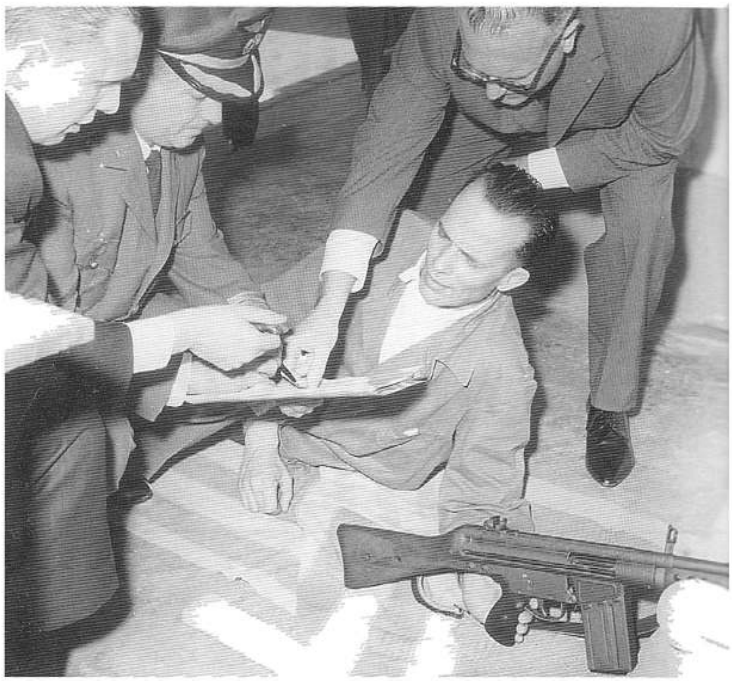
In a speech presented at the ADPA (American Defense Preparedness Association) annual meeting on October 15, 1981 to announce that H&K Incorporated's new plant was soon to be erected in Chantilly, Virginia, the state of the H&K weapon systems programme was described as follows:

> *. . H&K weapon systems have been adopted as standard and are manufactured in many nations of the world. To date a total of six to seven million G3 and HK33 rifles have been produced and they are employed in 50 countries world-wide. A total of 50,000 HK21 and HK21A1s have been produced to date, and delivered to some 20 countries . .*

The following list of client countries which are known to have purchased rifles made by H&K or H&K-licensed manufacturers and assemblers has been compiled from several sources. A key to these sources, which are acknowledged by their initials at the beginning of each entry, is as follows:

472. Italian troops of the 9th Parachutist Assault Regiment "Col Moschin" deployed with IFOR in Bosnia were issued with H&K G3 SG1 sniper rifles. Note the "expedient" cheekpiece.

This photo was taken in March, 1996 in Sarajevo.
courtesy VS Books/Carl Schulze



473. Can't Win 'Em All Department: H&K senior weapons technician Karl Schäfer demonstrating a wood-stocked G3 in Peru during the 1960s.

Despite the obvious interest, it appears there was no sale at that time. courtesy the late Karl Schäfer

474 (below). A Peruvian officer test-fires a G3 fitted with metal forend and bipod while Karl Schäfer looks on attentively. courtesy the late Karl Schäfer

475. In an impromptu adverse condition test, H&K Senior Technican Karl Schäfer hurls a G3 into a muddy patch of ground during the demonstration in Peru.
courtesy the late Karl Schäfer

476. Retrieving the mud-covered rifle, Karl Schäfer immediately fires off a full magazine of cartridges.
courtesy the late Karl Schäfer

- DS: article by Dan Shea in the June, 1996 issue of *Machine Gun News*
- HK: H&K Inc brochure, Arlington, VA
- SAT: *Small Arms Today* (2nd Edition) by Edward C Ezell
- VK: Major (ret) Volker Kurtz, International Co-ordination Manager, H&K GmbH
- WS: Wolfhart Fritze, FGS Frex Ltd

Source	Country	Date	Details
SAT	Bangladesh		G3A2s from Pakistan Ordnance Factories; G3A3s from H&K
SAT	Bolivia		G3s from H&K
HK	Brazil	1971 (SAT)	Air Force purchased 15,000 5.56mm HK33s
SAT	Brunei		G3s from H&K
SAT	Chad		G3s from H&K; (WS) probably assembled by MAS in France
SAT	Chile	1975	500 HK33s from H&K
HK	Colombia	(SAT)	30,000 HK G3s acquired in early 1970s; Industria Militar (INDUMIL) assembles G3s, manufactures some less complicated parts
SAT			Portuguese-made G3s used by traffickers
SAT	Dominican Republic		G3s from H&K
SAT	El Salvador		G3s; from Indonesia?
SAT	Ghana		approximately 12,000 G3s from H&K
SAT	Guyana		G3s; from H&K?
SAT	Haiti		G3A4s from MAS
SAT	Ireland (Rep)		HK33s from H&K
SAT	Italy		G3 SG1s from H&K
WS	Kenya		G3s from H&K
SAT	Malawi		G3s from H&K
HK	Malaysia	(SAT)	50,000 HK33s + some G3 SG1s purchased
SAT	Paraguay		G3s from H&K
SAT	Peru		G3A3s (WS) from EBO in Greece
SAT	Somalia		G3s from H&K
SAT	Spain		HK33s used by *Guardia Civil*
SAT	Switzerland		HK33 SG1s used by airport police in special mountings on APCs
SAT	Tanzania		HK33s & G3s: origin uncertain (WS): some HK32s
SAT	Togo		approx 1,000 G3s from MAS(?)
SAT	Zimbabwe		G3s from Portugal

Licensed User/Manufacturers

A further excerpt from the 1981 ADPA speech initially quoted above reads as follows:

> . . *Additionally, H&K has established licensing and manufacturing agreements and operations in some 14 countries of the world* . .

Until 1977 these licences were not granted by H&K, but directly by the German Ministry of Defence to the government of the licensee country. Such licences included the production rights to the Rheinmetall MG1 and MG3 as well.

The licences granted to Norway, Sweden, Iran, Turkey and Portugal fall into this category, and were all negotiated by the German MoD. All these licences contained a "ceiling" on royalties, so that once a certain amount of money had been paid, further production was free.

In 1977 the German MoD confirmed that all rights to the G3 were the property of H&K, so production licence agreements signed after 1977, such as with Greece and Mexico, were granted by H&K. The rights to the HK33 and the MP5 were always owned by H&K.

Transporting H&K's Sole-Source Manufacturing Philosophy Abroad

A further excerpt from the earlier undated typescript brochure titled "H&K Weapons Systems" describes the benefits to licensee countries of H&K's unique sole-source manufacturing philosophy, discussed in Chapter Seventeen, as follows:

> . . *Because of this complete in-house capability, H&K is also able to furnish a complete package of manufacturing know-how and to export a complete factory ready for operation in a licensee country. This package includes the entire infrastructure of machinery, tooling, ancillary equipment, and training courses for licensee country workers.*
>
> . . *Heckler & Koch weapons are produced in 14 countries of the world under licensed arrangements, where H&K is responsible for supplying the know-how and all manufacturing plans and designs such as manufacturing design, operation plans, lay-outs, tooling designs, etc. Finally, the company supplies all the gauges, tooling, and complete factory equipment as well as most of the machinery.*
>
> *All weapons parts purchased under H&K licensed agreements are completely interchangeable and regular interchangeability tests are carried out under supervision of the German Army Inspection Team.*

Countries which have manufactured, or still are manufacturing H&K designs under license include Burma, Colombia, Greece, Iran, Malaysia, Mexico, Norway, Pakistan, Portugal, Saudi Arabia, Sweden, Thailand, and Turkey. The products of every one of these countries (except Colombia) are discussed below, in alphabetical order by country.

Some details of these programmes, such as quantities manufactured, are generally proprietary, but wherever possible the markings used on each manufacturing country's products are shown as an aid to identification.

The assembly and marking of H&K products in France and the United Kingdom fall into a rather special category, and these are discussed in Chapter Twenty-five.

Burma

Adopting the First Issue (1959 Model) G3

The only photo of a Burmese G3 available shows the rifle after its conversion to 5.56mm, as discussed below.

However the early features of this rifle (wood butt and forearm, two-position folding rear sight) indicate that the Burmese were among the first to manufacture the G3 under licence, as the design follows the specifications of the original *Großerie* of 1959.

The G3 production licence for Burma was negotiated in the early 1960s, with the "Fritz Werner" (FW) company of Geisenheim, then a state-owned

machine tool manufacturer and industrial plant supplier, acting as a go-between with the Burmese and German governments. At the outset of the programme some Burmese G3s may have been assembled using Rheinmetall-made components.

Converting the Burmese G3 Arsenal to 5.56mm

477. left and right side views of a G3 of the Burmese Army after conversion to 5.56mm calibre by a team of Czech specialists. This story is related in the text, below.

Note the circa 1959 configuration of the rifle, and the positive bolt closure device on the right side, below.

While the magazine closely resembles the M16 30-round magazine, it was actually redesigned completely as part of the package. courtesy Dr Lubomir Popelinsky

Dr Lubomir Popelinsky, now a Professor of English at the University of Defence in Brno, the Czech Republic, has kindly supplied the following account of his involvement in the conversion of the Burmese Army arsenal of 7.62mm G3s to 5.56mm calibre during the early 1990s:

Conversion of the G3 Rifle to 5.56x45mm for the Burmese Army

The German 7.62mm G3 rifle was produced in Burma under license, in a programme supervised and directed by a group of German specialists.

In the spring of 1990 the Burmese Army contacted the Omnipol organisation in Prague (Czechoslosvakia) with a requirement for the conversion of this rifle to calibre 5.56x45mm NATO. At the beginning of June, 1990 two Czechoslovak specialists, designer Lubomir Popelinsky and technologist Jan Tejzr, were sent to Rangoon to prepare the contract. Their preparatory work in the military factory in Rangoon was completed in two weeks. In addition to this preparatory work they tested two experimental rifles elaborated by the Burmese Army in calibre 5.56x45mm. These tests showed that the Burmese experimental rifles were deficient in accuracy and in functional reliability. So the officers of the Burmese Army made a final decision to request that their G3 rifles be converted in a programme to be undertaken by the research center ZVS-VVÚ Brno in Czechoslovakia (now the Czech Republic).

The Burmese Army stipulated that the conversion be accomplished using the greatest possible number of components of the G3 as produced in Burma without alteration. The Czechs accepted this requirement, but due to the drastic dimensional differences between the 7.62mm and 5.56mm cartridges, it was found necessary to replace several important components of the rifle with newly-designed components.

For the pilot conversion, three G3 rifles produced in Burma served as the basis for three calibre 5.56x45mm prototypes, which were produced and tested by the end of 1990. Following the successful conclusion of these tests, the prototypes were sent to Burma.

This pilot project has proven that the required conversion was feasible. The changes to the basic rifle included the following:

1. *the production of a new barrel, with flash suppressor*
2. *changes to the breech mechanism (breech block and breech block carrier) with extractor*
3. *a new ejector*
4. *a new magazine, produced from aluminum alloy*
5. *modification to the rear sight and several small components.*

An additional requirement of the Burmese Army was to include a special arrangement which would enable the operator to press the breech block carrier into its locked position after slowly guiding the bolt assembly forward by hand. The reason for this requirement was connected with real battle conditions. Normally, after cocking the rifle, the handle is released and the breech mechanism goes forward under the impetus of the return spring. But the impact of the closing bolt causes noise, which can warn the enemy. To prevent this, it is necessary to guide the breech mechanism forward slowly by hand. Because the cocking handle of this rifle is not connected firmly with the carrier, this can result in incomplete locking, in which condition it is not possible to fire the weapon. Therefore it is necessary to have some arrangement to press the carrier fully forward. The system utilised functions in a similar way to that of the US M16A1 rifle. It is an oblique spring-loaded shifter placed on the right side of the weapon casing which protrudes into the space behind the carrier when the shifter is pressed forward by the hand of the soldier. This oblique forward motion forces the bolt carrier into its correct locked position.

The redesign worked well, and measurements conducted in 1990 showed that the Burmese G3 rifle (after the conversion) has the following technical characteristics:

calibre: 5.56x45mm
cartridge: . . . . . M193 or SS109
barrel length: . . . . . 390mm or longer
number of rifling grooves: 6
1 turn in: . . . . . 305mm [12"] or 178mm [7"], depending on the cartridge
overall length: . . . . . 970mm (with 390mm barrel)
overall width: 60mm
overall weight: . . . . . 4.0 to 4.5kg [8.8 - 9.9 lbs]
muzzle velocity . . . . . over 900m/s [2,953 fps] (according to the barrel length . . . . . and cartridge)
rate of fire: . . . . . 500 to 600 rpm
magazine capacity: . . . . . 30 cartridges.

In January, 1991 the prototypes and the technical documentation supporting the conversion were sent to Burma. In February a small group of Czech technicians under the leadership of the young designer Zdeník Hoøák arrived in Rangoon to prepare for the serial conversion of the Burmese Army G3s to 5.56mm, according to the Czech design. The work of this group was successfully completed in several months.

Dr Popelinsky later appended some additional information to this rather remarkable story. In response to a query from the author regarding the effect, if any, of the conversion to 5.56mm on the original locking angles, he replied that "The curves in the barrel extension for the rollers in the 5.56mm G3 are the same as in the original 7.62mm rifles, but the oblique surfaces on the locking piece (*Steuerstück*) have a slightly greater inclination."

In response to a further query regarding the source of the 30-round 5.56mm magazines used in the conversion, which appear identical to the stand-

ard 30-round M16 magazine, Dr Popelinsky explained that all the work to effect the the conversion was done in 1990, at which time the exact dimensions and tolerances of the US magazine were not available in Czechoslovakia. In addition, as noted above, the Burmese Army had specified that production drawings for the aluminum alloy magazine and its tooling be supplied as part of the conversion package. Therefore the Czech designers had no choice but to "re-invent the wheel" by reverse-engineering the standard US magazine for manufacture in Burma.

Denmark

Although Denmark did not actually manufacture the G3, the history of these rifles in Danish service is rather unique, and so it has been included here.

The 7.62mm *gevær* M/66

478. Left side views of the two types of G3 rifles in Danish service.

Above: the 7.62mm *gevær* M/66, of which approximately 3,500 were procured from H&K in 1966 for use as sniper rifles. Note the Hensoldt FERO Z24 scope and the extended plastic buttstock.

Below: the 7.62mm *gevær* M/75, 70,000 of which were leased directly from *Materielamt* stocks. Note the earlier wood furniture. The M/75s were all ex-*Bundeswehr* rifles, and thus bear standard German markings.

courtesy *Vaabenhistorisk Selskab*/ Finn Nielsen

During the 1950s and 1960s the standard rifle of the Danish Army was the US .30 calibre M1 Garand, called the M/50 in Danish service. The Danish Home Guard wished to introduce a more modern weapon for special purposes, and a limited number—approximately 3,500—G3s were procured from Heckler & Koch in 1966 for use as sniper rifles. This rifle, designated the 7.62mm *gevær* M/66, was "customised" with the addition of a series of heavy vertical striations in a shallow dished area on the side of the bolt carrier, intended to act as a thumb-assisted bolt closure device. (In Denmark this was later called the

479. Left side closeup of the Danish *gevær* M/66 serial no 1589, showing markings.

Note the crowned "HTK" which stands for *Hærens Tekniske Korps* (the name of the Danish Army Materiel Command before 1968). courtesy J S Vigsnæs

480. Right side closeup of a Danish *gevær* M/66, showing markings indicating manufacture in February, 1967. courtesy J S Vigsnæs

"Norwegian-type bolt", depicted under Norway in fig 512, although its first appearance was actually in the Swedish Ak 4, as shown in fig 548).

The selector markings are the same as on the German-issue G3, since the Danish words begin with the same letters. In Danish the settings are 'S'=*Sikret* (Safe); 'E'=*Enkeltskud* (Single fire); 'A'=*Automatisk* (Automatic).

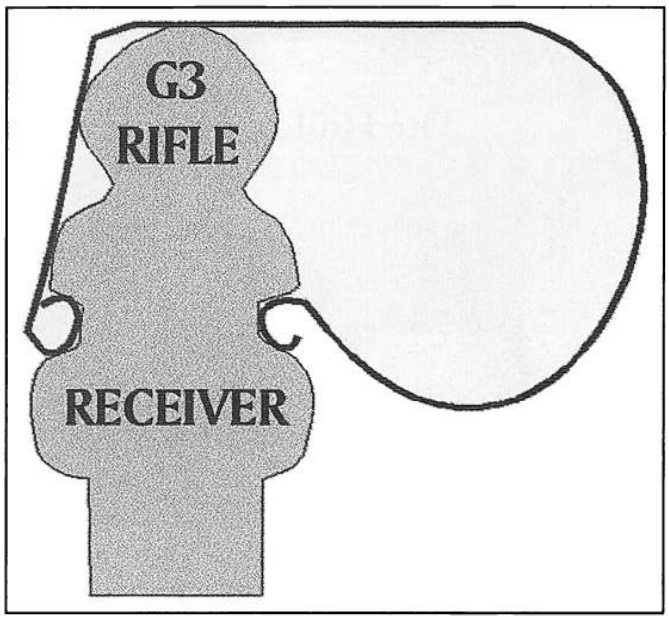
The 7.62mm *gavær* M/75

481. A Danish soldier on exercise. The rifle, probably a *gevær* M/66, is fitted with the Danish M/81 shell deflector (fig 483) behind the ejection port, a laser sight mounted in the boxlike device beside the front sight, and a BFA. courtesy Finn Nielsen

482. A sodier of the Danish Reaction Brigade deploys during exercise "Cold Grouse 95".

Note the rifle is fitted with the M/81 shell deflector, which was introduced for use only in peacetime.

courtesy VS Books/Carl Schulze



483. Rear sectioned closeup of the G3 rifle receiver fitted with the stamped-metal M/81 shell deflector, introduced in 1981 after some serious eye injuries were suffered from fired cases deflected from door openings or walls during exercises. The M/81 was used only in peacetime with both the M/66 and M/75 rifles when firing blank or ball ammunition. courtesy W/O Troels Østergaard

In 1973, with the excuse to the politicians that the M1 Garand could not fire automatically, the Danish Army began testing a number of available selective-fire rifles. The test ended with the 5.56mm US M16A1 as the winner, and the H&K G3 as no 10 on the short list. However, for several reasons, one being that the 5.56mm cartridge had not yet been declared NATO standard and another that there were already some G3s in the system, the Danish Army postponed their decision and instead entered into a lease agreement with the German military authorities concerning a further 70,000 G3 rifles, taken directly from *Materielamt* stocks.

Although these rifles were in basically the same configuration as the previously purchased M/66s, they were designated the 7.62mm *gevær* M/75. The *gevær* M/75s were all ex-*Bundeswehr* rifles, and thus bear standard German markings.

In 1996 Denmark finally purchased these rifles, which had previously been leased, and also some further quantities of G3 rifles from the *Bundeswehr*.

Over the years some components were apparently also purchased elsewhere, as G3 components in Danish service have been noted bearing markings indicating Greek, Norwegian, Swedish and Turkish manufacture.

484. Rear closeup of a Danish G3 fitted with the expedient sunshade - an M1 Garand clip - over the diopter rear sight. During the 1980s some units were still issued with the M/50 (Garand), and it was common practice for users of the M/75 (G3) rifles to fit an M1 clip as shown to shade the rear sight in strong sunlight.

courtesy W/O Troels Østergaard

Greece

The Hellenic Arms Industry (EBO) G3A3 and G3A4

485. The Greek Minister of Defence, left, shakes hands across the table with H&K director Alex Seidel, right, on the occasion of the signing of the contract establishing the G3 factory in Greece. This ceremony took place in Athens in September, 1977. courtesy Wolfhart Fritze

The contract for the establishment of the G3 factory in Athens was signed between H&K and the Greek MoD in September, 1977. Approximately 200,000 fixed-stock G3A3s and retractable-stock G3A4s were manufactured under license by the Hellenic Arms Industry SA (EBO) of Athens, for use by Greek armed forces. The stock on the G3A4 version differs slightly from the German version.

The H&K factory identifier for the version used in the Greek G3 programme was 224043. One of the few differences on this model from the standard German version was that the end cap on the cocking handle tube was originally made from steel, rather than the standard anodised aluminum. This was the result of an error in the contract, whereby H&K forgot to include the anodising equipment in the list of machinery. The steel cap was later adopted by the Greek Army as substitute standard.

Today, parts marked "EBO" (pronounced "Evo") are found in a number of Aftermarket HK91 clones, including those marketed by Sabre Defence of the UK (figs 660 and 661).

486. Left side closeup of Greek Army G3A3 serial no 067141, manufactured by the Hellenic Arms Industry SA (EBO) in September, 1981.

Note the large diamond-shaped 'EBO' logo stamped into the lower receiver, and the distinctive Greek selector markings. H&K GmbH, photo by Reiner Herrmann

487. A soldier of the Greek KFOR contingent in Kosovo in late 1999 armed with a Greek G3A4. The vehicle is an M113 APC fitted with a Greek-made MG3.
courtesy VS Books/Carl Schulze

488. Soldiers of the Greek KFOR contingent in Kosovo in late 1999, armed with EBO-made G3A4s. The vehicle is a French-made VBL wheeled LAV.
courtesy VS Books/Carl Schulze

The Hellenic Arms Industry EHK21E

489. Left side closeup of the EBO EHK21E configured for belt feed. courtesy the late Dr Edward C Ezell

490. Left side closeup of the EBO EHK21E configured for magazine feed. courtesy the late Dr Edward C Ezell

491. A soldier of the Greek KFOR contingent in Kosovo in late 1999, armed with an EBO HK21E configured for magazine feed. courtesy VS Books/Carl Schulze

Hellenic Arms Industry SA also manufactures a version of the HK21A1 LMG called the EHK21E, with both magazine- and belt-feed capability by means of interchangeable feed group assemblies. HK11A1s and HK21A1s, assembled by EBO, were intended to replace the obsolete Bren guns still in service in the late 1970s and early 1980s.

EBO also produced the MG3 at its Aeghion facility under licence from the German MoD, with technical support supplied by Mauser, since Rheinmetall was not interested.

Iran

The state-owned Fritz Werner (FW) machine tool company made the deal to set up G3 and MG3 production in Iran after the German MoD had granted the licence. The G3 rifle has been manufactured in Iran under licence since the days of the late Shah. The H&K factory identifier for the Iranian G3 programme was 224039.

Three Types of Iranian Markings

Historically, there have been three distinct types of markings used on Iranian-made G3s and MP5s, as follows:

1. Arms manufactured during the reign of the late Shah Pahlavi.
2. Arms manufactured during the primacy of Ayatollah Khomeini.
3. Arms currently manufactured by the Defence Industries Organisation (DIO), an affiliate of the Iranian Ministry of Defence and thus wholly-owned by the government of the Islamic Republic of Iran.

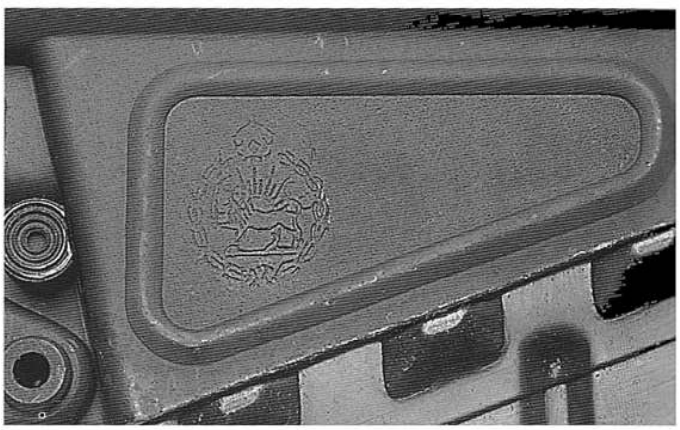
These three distinct types of markings are depicted below.

Early (Shah Pahlavi) Manufacture

492. Left side closeup of an early Iranian G3, manufactured under the reign of the late Shah Pahlavi.
courtesy H&K GmbH, photo by Reiner Herrmann

493. Left side closeup of the above early Iranian G3, showing markings.

While these are in Persian, they are in the same format as German markings with "3-G" designation at top left, serial number "0083" at top right, and date of manufacture, below. (The date actually reads "2535" (1976), according to the Imperial calendar introduced by the Shah as part of his programme to modernise Iran.)
courtesy H&K GmbH, photo by Reiner Herrmann



494. Right side closeup of early Iranian G3, showing crowned and wreathed lion with scimitar, the crest of Iran under Shah Pahlavi.
courtesy H&K GmbH, photo by Reiner Herrmann

495. Shah Pahlavi and his wife take the salute as a contingent of Iranian troops, armed with Iranian-made G3 rifles, passes in review. courtesy Arastou Rafizadeh

496. The Shah's brother, Golamreza Pahlavi, reviews élite troops armed with Iranian-made G3s in 1978.
courtesy Arastou Rafizadeh

Manufacture under Ayatollah Khomeini

497. Right side view of a G3 rifle manufactured in Iran during the primacy of the Ayatollah Khomeini, fitted with green plastic furniture.
MoD Pattern Room collection, photo by Richard Jones

498. Left side closeup of Iranian G3 manufactured during the primacy of Ayatollah Khomeini, showing markings.

Compare with fig 493: these Persian markings are also in the same format as the German originals with "3-G" designation at top left, serial number "942681" at top right, and date of manufacture "1364" (1985), according to the Iranian solar calendar.

MoD Pattern Room collection, photo by Richard Jones

499. Right side closeup of Iranian G3 manufactured during the primacy of Ayatollah Khomeini, showing marking.
MoD Pattern Room collection, photo by Richard Jones

Current Manufacture by Defence Industries Organisation (DIO)

500. Right side view of a G3 rifle as currently made under licence in Iran by Defence Industries Organisation (DIO). As shown below, these rifles bear the third type of Iranian markings. MoD Pattern Room collection, photo by Richard Jones

501. Left side closeup of the DIO "3-G" depicted in fig 500, serial no "92922", manufactured in "1366" (1987) according to the Iranian solar calendar.
MoD Pattern Room collection, photo by Richard Jones

502. Right side closeup of DIO G3, showing third type of Iranian marking as used on current production.
MoD Pattern Room collection, photo by Richard Jones

A brief excerpt from the DIO website from 2004 states as follows:

Defence Industries Organisation (DIO) . . was established in 1924 . . After the victory of the Islamic revolution and the return of foreign experts, and with the urge to self-sufficiency in military products . . DIO is the most experienced organisation of this field in Iran and even the Middle East.

The range of DIO production activities includes different groups in the fields of ammunition, armaments, vehicles and equipment, chemicals (powders and explosives), marine and NBC protection equipment.

. . DIO has more than 35,000 employees, 30% of whom are university graduates . .

The Tondar ("Thunder") SMG and Other DIO Products

503. Right side view of the MP5K currently produced in Iran by DIO as the Tondar ("Thunder") SMG.
Inset, right: a closeup of the "crossed G3 and MG3" DIO crest as stamped on the magazine housing.
MoD Pattern Room collection, photo by Richard Jones

In the small arms field, aside from fixed- and retractable-stock versions of the G3 rifle, other H&K products manufactured under licence in Iran include the standard MP5 and MP5K, both of which are produced in Iran as the Tondar ("Thunder") SMG. A version of the Rheinmetall MG3 is also produced.

504. Left and right side closeups of the Iranian Tondar SMG as currently manufactured by DIO, showing markings.

The inscription on the plastic grip behind the selector translates as "Islamic Republic Defence Industry/War Industry Manufacturing".

The change lever markings are in Arabic numerals, above, but in Persian script, below, where the characters are "Z" (*Zamen*, Safe); "T" (*Taktir*, Semi-automatic); "R" (*Ragbar*, Fully-automatic).

MoD Pattern Room collection, photo by Richard Jones

Malaysia

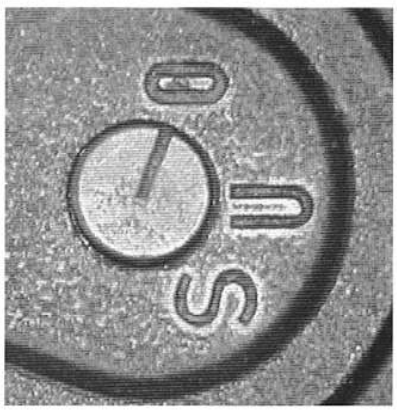
505. Right side view of a Malaysian-issue HK33, fitted with the one-piece black plastic stock and Export handguard with bipod.
The Hensoldt 4x24 scope is a later addition.
courtesy Richard Jones

506. Right side closeup of Malaysian HK33, showing markings applied in Oberndorf before shipment.
courtesy Richard Jones

507. Left side closeup of Malaysian HK33 showing generic H&K markings courtesy Richard Jones

A total of 55,000 HK33 rifles were shipped as parts sets to Kuala Lumpur and assembled there with the help of H&K personnel in 1980 before being handed over to the Malaysian Army. The rifles were then proof fired, and the bolt heads and barrels were serially numbered to match the receivers, which had been numbered in Oberndorf before they were shipped. The Malaysian arsenal acronym "PDM" and the distinctive selector markings were also put on in Germany prior to the surface treatment. which consisted of phosphating and overspraying with black-paint.

H&K staff remained in-country for several years, first concentrating on assembly and later overhauling and retrofitting damaged weapons.



508 (right). Closeup of the distinctive selector markings applied to the Malaysian HK33.
courtesy Richard Jones

Mexico

G3 Manufacture by Defence Industry Mexico SA (DIM)

509. Left side closeup of G3 serial no P-001, the first prototype manufactured by Defence Industries Mexico SA.
Note the Export plastic handguard.
courtesy H&K GmbH, photo by Reiner Herrmann

G3 rifles were manufactured under license from H&K beginning in 1979 by Defence Industry Mexico SA (DIM). The H&K identifier of the Mexican model G3 was 224001.

510 (right). Right side closeup of G3 serial no P-001 manufactured by Defence Industries Mexico SA, showing eagle, snake and cactus Mexican national crest under legend "Fabrica de Armas Mexico".
courtesy H&K GmbH, photo by Reiner Herrmann

Norway

The AG 3 (*Automatisk Gevær* 3)

511. Left side closeup of AG3 serial no 01001, the first prototype of the Norwegian G3.

Note the Norwegian coat-of-arms, below the serial number, denoting official government ownership.

Norwegian AG3 magazines were all made from aluminum. courtesy Vidar Andresen

G3 rifles were produced under license from H&K in a joint venture by the Kongsberg *Våpenfabrikk* (Kongsberg Arms Factory) and the Raufoss *Ammunisjonsfabrikker* (Raufoss Ammunition Factories). A total of 100,000 of these rifles were sent to Germany—an initial shipment of 15,000 AG3s in 1965 and a further 30,000 within 1966—as part of a military arrangement whereby Norway received some submarines, some Rheinmetall MG3s and other important military equipment in exchange. The Norwegian AG3s supplied to the *Materielamt* were fully interchangeable with their Rheinmetall and H&K counterparts, and were issued as required to the *Bundeswehr* alongside regular G3s from German production.

AG3s for the Norwegian Armed Forces were produced after the German order was filled. Most of those issued to the Norwegian *Heimevernet* (HV; the Home Guard) were produced in 1973, and they have remained on issue there for over 30 years. The Kongsberg production line has long been mothballed, and will never be revived.

The G3 is well-liked in Norway, where it has proven to be a sturdy rifle, simple and dependable, with few technical problems, although it is not known for hair-splitting accuracy.

The youth organisation of the Home Guard is now issued with G3s as well, replacing their previous Mauser bolt-action rifles, although these G3s are fitted with selector levers which can deliver only semi-automatic fire.

The AG 3 Bolt Closure Device

The Norwegian-made AG3s also have the thumb-assisted bolt closure device, which as described in the section on Denmark consists of prominent ridges or grooves machined into the bolt carrier, where they are accessible through the ejection port.

512 (right). Right side closeup of a typical Norwegian AG3, showing markings.

The crowned 'K' and date indicates manufacture by Kongsberg Våpenfabrikk in September, 1968.

Note (above) the series of ridges or grooves machined into the bolt carrier, which act as a thumb-assisted bolt closure device. courtesy Vidar Andresen

513. Left side closeup of an AG3, serial no 400002 hand-stamped "DK".

It appears that a series of AG3s was made for Denmark, and that this was the second prototype.

Note the absence of the Norwegian coat-of-arms, below the serial number. courtesy the late Dr Edward C Ezell

514. Soldiers of the Norwegian Army photographed during exercise "Arctic Express 94".

The soldier at left is armed with an AG3 fitted with an H&K79 40mm grenade launcher, while the soldier at right holds a fixed-stock MP5 which has been randomly wrapped with white tape in order to break up the outline of the gun in snowy conditions.

courtesy VS Books/Carl Schulze

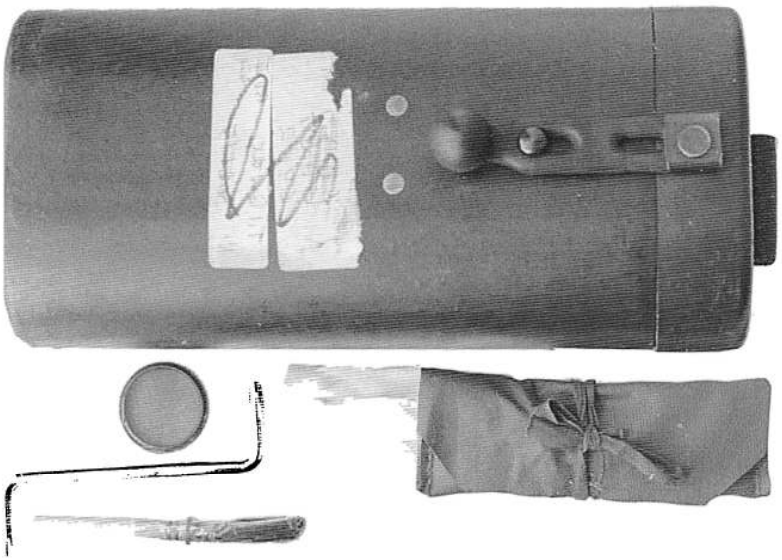
The AG 3 as a Sniper Rifle

515. Top view of the OIP 3.6x telescopic sight adopted for sniper use by Norwegian forces.

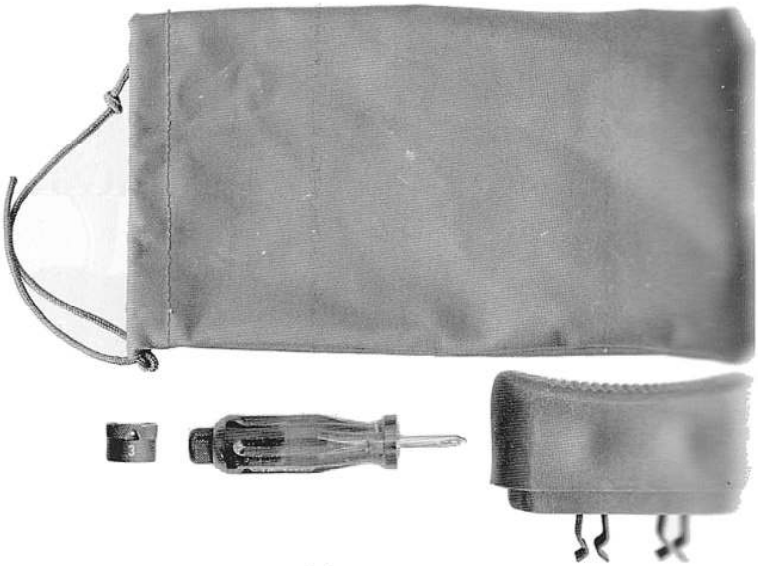
Note the small adhesive-backed plates, one featuring the maker's identification and serial number, and the other the Norwegian coat-of-arms, signifying official government property. courtesy Vidar Andresen

The sniper parts set which converts the AG3 to a sniper rifle includes the OIP 3.6x scope in its hard case, with accessories, plus a special rear sight drum, a rear sight adjusting tool and an extended buttplate. These components are housed in a rubberised, drawstring pouch.

516. Left side closeup of a Norwegian AG3 sniper rifle, serial no 294561, with OIP scope shown fitted in H&K mount. courtesy Vidar Andresen



517. AG3 sniper parts set consisting of a plastic scope container, top, plus adjusting tool, darkened sun filter, lens brush, cloth, and small pouch to contain these latter items. courtesy Vidar Andresen



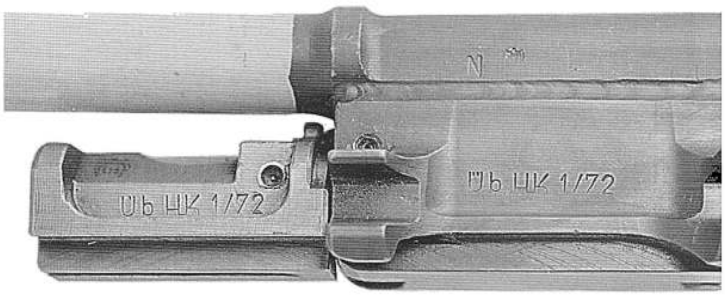
518. More components of the sniper parts set. At top is the rubberised drawstring pouch which contains the special rear sight drum shown below plus its adjusting tool and an extended buttplate which snaps on the stock, replacing the normal buttplate. courtesy Vidar Andresen

Other AG 3 Accessories

519. Two variations of AG3 bayonets and their scabbards.
Above: new style, with grooved grip.
Below: old style, with US-type blade and crossguard.
Both scabbards resemble the common US pattern.
courtesy Vidar Andresen

Other AG3 accessories include a cleaning kit, bayonet, magazine pouches, and a special bolt with no locking rollers for use with short-range (blue plastic) training cartridges. Some HK79 40mm grenade launchers were also purchased from H&K by the Norwegian Army.

Other accessories, now obsolete, include rifle grenades and sights, empty case catchers and a muzzle deflector for blank firing.



520. Left side closeup of the special light short-range bolt assembly, with no locking rollers, for use with plastic training ammunition.

Note the markings "Üb (*Übung* = training) HK 1/72", indicating manufacture for Norwegian forces by H&K in January, 1972.

The Norwegian version of the short-range bolt has the normal cartridge seat diameter in the bolt face, in contrast to some other countries which for safety reasons use a reduced-size cartridge seat and cartridge rim diameter.
courtesy Vidar Andresen

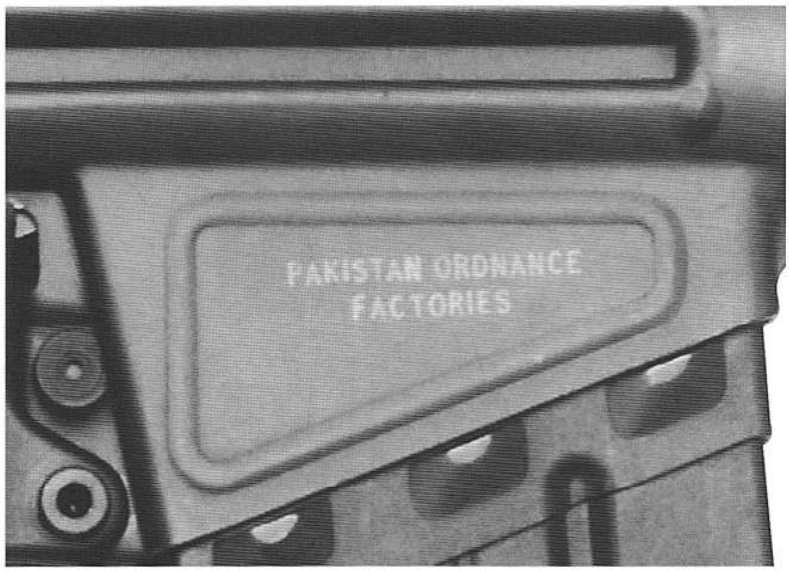
Pakistan

"Force to the Force": the Pakistan Ordnance Factories (POF) G3A2, G3A3 and G3A4

521. The front gates to the Pakistan Ordnance Factories (POF) complex in Wah, Pakistan.

Judging from the pavement below the doors, trucks exiting the factory are somewhat heavier than those entering. courtesy MoD Pattern Room Library

522. Left side closeup of the special presentation POF G3, serial no 1285, showing markings.
courtesy H&K GmbH, photo by Reiner Herrmann



523. Right side closeup of the early G3 manufactured by POF which was presented to Heckler & Koch, showing markings.
courtesy H&K GmbH, photo by Reiner Herrmann

524. Left side closeup of a production G3, serial no C79267, manufactured by POF in 1974.
courtesy H&K GmbH, photo by Reiner Herrmann

The motto on the brochure of the Pakistan Ordnance Factories (POF) is "Provide Force to the Force". This facility in Wah manufactures a wide variety of military ordnance including mortar bombs, aircraft bombs, mines, grenades, pyrotechnics, rockets, military and commercial explosives, ammunition of all types for small arms, artillery, tank, anti-tank, aircraft and anti-aircraft uses.

The wood-stocked G3A2 rifle was manufactured up to the end of 1986, following which G3A3 (fixed plastic stock) and G3A4 (retractable stock) production was begun in mid-1986. Both these later weapons are configured in the "export version", fitted with broad plastic "tropical" handguards and bipods.

The POF PK-7 Submachine Gun in Calibre 7.62x39mm

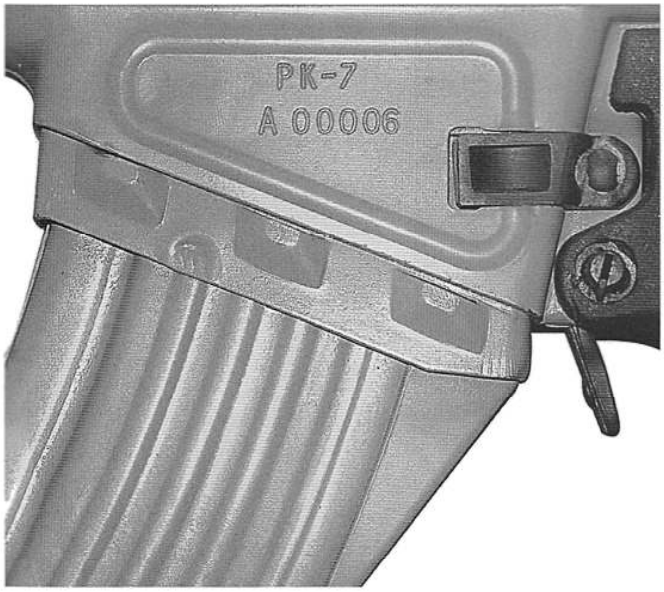
525. Left side view of an early prototype of the interesting "Submachine Gun PK-7" in calibre 7.62x39mm, as introduced by POF at Eurosatory in Paris in June, 2006.

Note the straight 20-round magazine with unusual fillet at the front. courtesy Wolfhart Fritze, FGS Frex Ltd

526. Left and right side views of what appears to be an early production example of the POF PK-7, serial no A 00006.

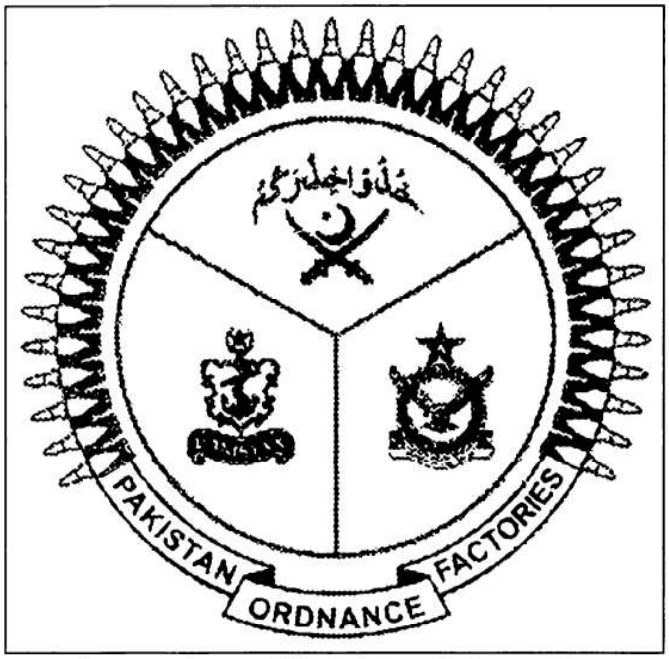
Compare with fig 525: note that the fillet has been relocated to the rear of the 30-round curved magazine.

MoD Pattern Room collection, photo by Richard Jones



527. Left side closeup of production PK-7 serial no A 00006, showing details of magazine construction.

Note that the magazine well is still dimensioned for 7.62mm NATO, and the top of the magazine appears to be standard as well, necessitating the rear fillet to adapt the shorter magazine body. MoD Pattern Room collection, photo by Richard Jones



528. The coat-of-arms of the Pakistan Ordnance Factories. courtesy Wolfhart Fritze, FGS Frex Ltd

POF took the occasion of the 2006 Eurosatory in Paris, one of Europe's largest and most prestigious arms fairs, to introduce their compact roller-locked "Submachine Gun PK-7". A brochure available at the POF booth described the PK-7 as follows:

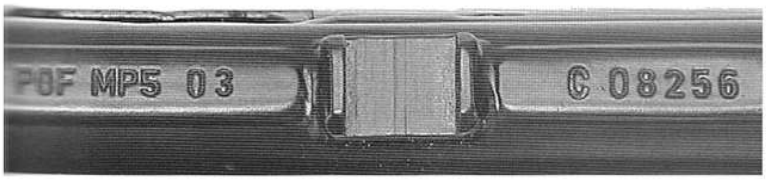
. . Submachine Guns are compact personal defence weapons used by soldiers, officers, paramedics, SSG personals, Civil Armed Forces and law enforcing agencies. The weapon has, therefore, to be light, compact, user friendly and must require minimum training and maintenance.

Based on the internationally accepted blowback recoil system of the H&K [G3] the SMG PK-7 is a compact submachine gun in calibre 7.62x39, [which] is a high energy steel core ammunition capable of defeating body armour and effective against urban fortification at medium ranges . .

Data

Calibre	*7.62x39mm*
Type	*ball/tracer*
Muzzle velocity	*615m/sec [2,018 fps]*
Rate of fire	*700 - 800 rpm*
Effective range	*300 metres*
Sights	*100, 200, 300m*
Weight	*3.6kg [7.9 lbs]*
Overall length	*820mm [32.3"]*
Barrel length	*267mm [10.5"]*

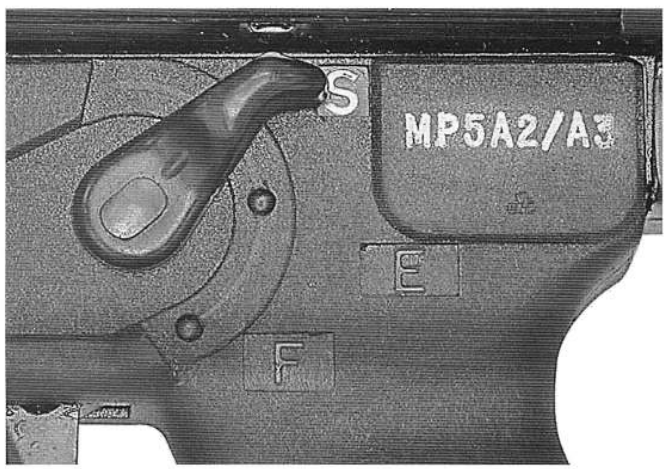
The POF 9mm "MP5A2/A3"



529. Top closeup of POF MP5 serial no C 08256, with scope base in centre.

The designation here reads "MP5 03", while as shown at right the grip is marked "MP5A2/A3".

MoD Pattern Room collection, photo by Richard Jones



530 (right). Left side closeup of POF MP5 serial no C 08256, showing "MP5A2/A3" markings.

MoD Pattern Room collection, photo by Richard Jones

531. Left side view of POF MP5A2/A3 serial no C 08256. The curved 30-round magazine is marked at the base "9mm x 19/POF". MoD Pattern Room collection, photo by Richard Jones

Portugal

The CETME Loses Out to the G3 in Portugal

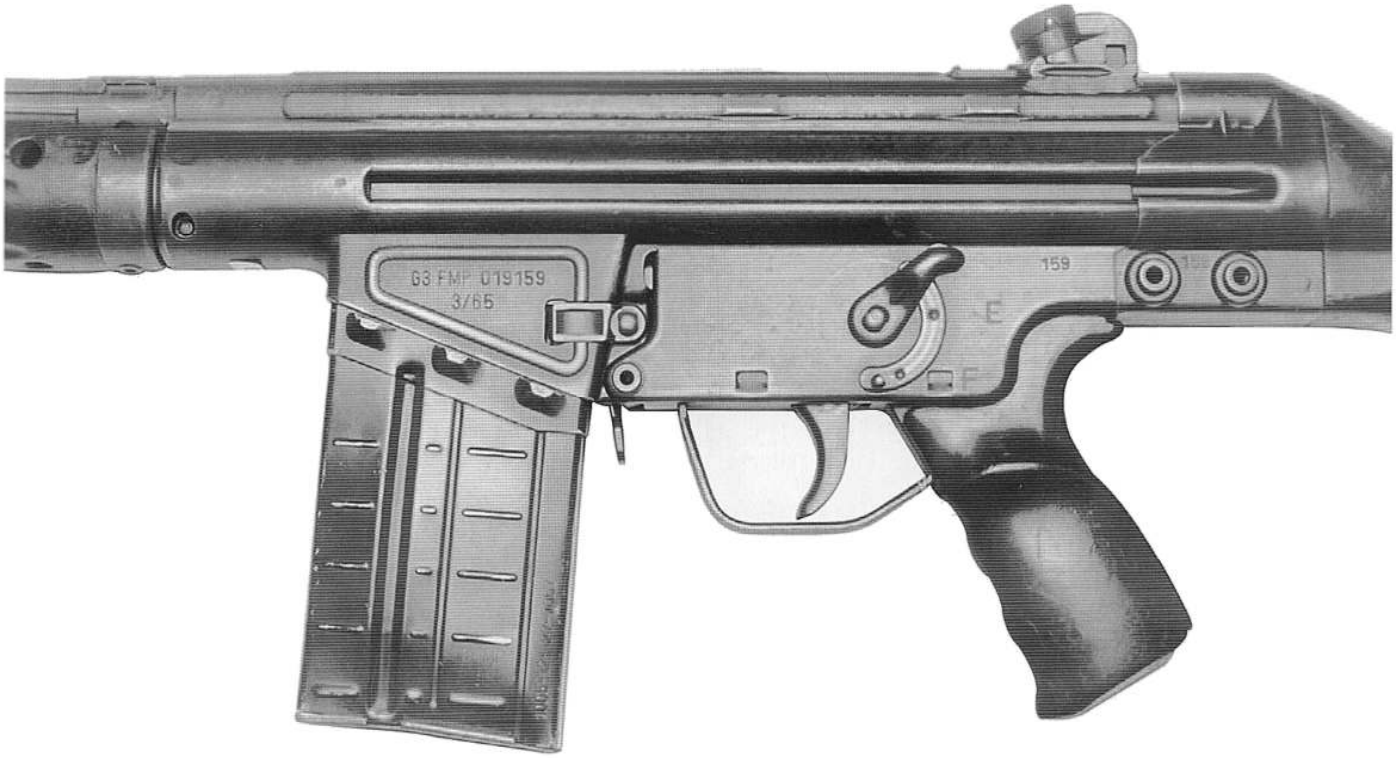
In a further excerpt from his "Development History of the 'CETME' Assault Rifles", *Dipl-Ing* Werner Heynen discusses the fate of the CETME in Portugal, and the ultimate adoption there of the G3 rifle, as follows:

> *. . Through the close connection of Spain with its neighbour Portugal, an early CETME rifle was demonstrated to the president of that country in May, 1953. Following the US trials of the weapon at Aberdeen in July, 1954, a new demonstration and discussion took place again in Lisbon. During the years there were repeated talks and demonstrations in Lisbon.*
>
> *In January, 1959, our engineers put on a competitive trial of our rifle against several others which resulted in a true success for the CETME weapon. In August, 1959, two weapons with 100 magazines were delivered for a thorough trial by the Portuguese themselves, which was equally successful. Despite the very impressive results, we were not successful, since the German Defence Ministry offered the Portuguese a very advantageous production contract, which was not signed until after the additional contracts between the German Defence Ministry and CETME had been finalised. Thus in Portugal the German-developed G3 was also produced.*

G3, HK33 and MP5 Production at Fabrica Militàr de Prata

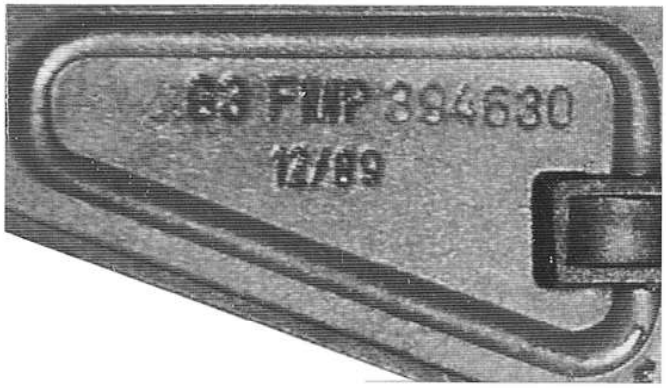
Licensed production of the H&K G3 began in Portugal in 1961, the resulting wood-stocked model being known as the M961. Later the plastic-stocked FMP *Espingarda Automatica* G3 M63 became the standard service rifle of the Portuguese Armed Forces.

As with the G3 rifles accepted by the German *Materielamt* from Norway in exchange for other military materiel, a similar arrangement was made with Portugal, and 100,000 Portuguese-made G3s were



532. Left side closeup of G3A2 serial no 019159 manufactured by Fàbrica Militar de Prata (FMP) in March, 1965.
courtesy H&K GmbH, photo by Reiner Herrmann

533. Left side closeup of FMP G3A2 serial no 246066, manufactured in January, 1972.
MoD Pattern Room collection, photo by Reiner Herrmann



534. Left side closeup of G3A2 serial no 394630, manufactured by FMP in December, 1989. courtesy Mark J Ive

sent to Germany and issued as required to the *Bundeswehr*.

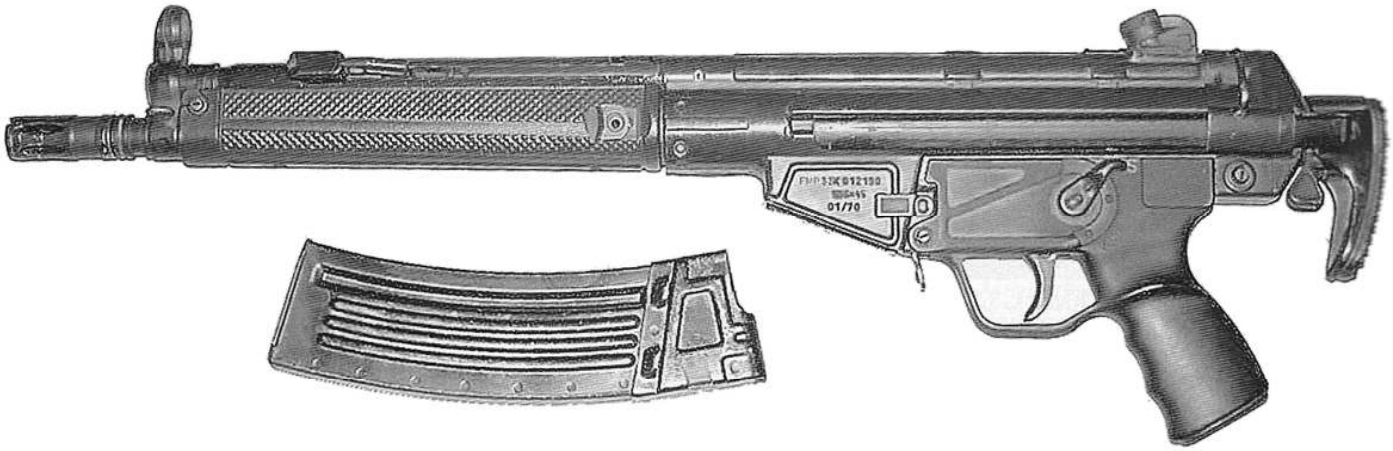
According to *Small Arms Today*, Zimbabwe acquired a quantity of G3s from FMP.

The Portuguese G3s were all of the G3A2 type, and were never made with the FS (*Freischwinger*) style of handguard attachment as used on the later H&K G3A3.

535. Soldiers of a Portuguese Long Range Reconnaissance Unit seen during the AMF(L) exercise "Strong Resolve 95", armed with G3A4 rifles (with retractable buttstocks) made by FMP in Portugal.

The rifles are randomly taped to break up their distinctive outlines against the snowy background.

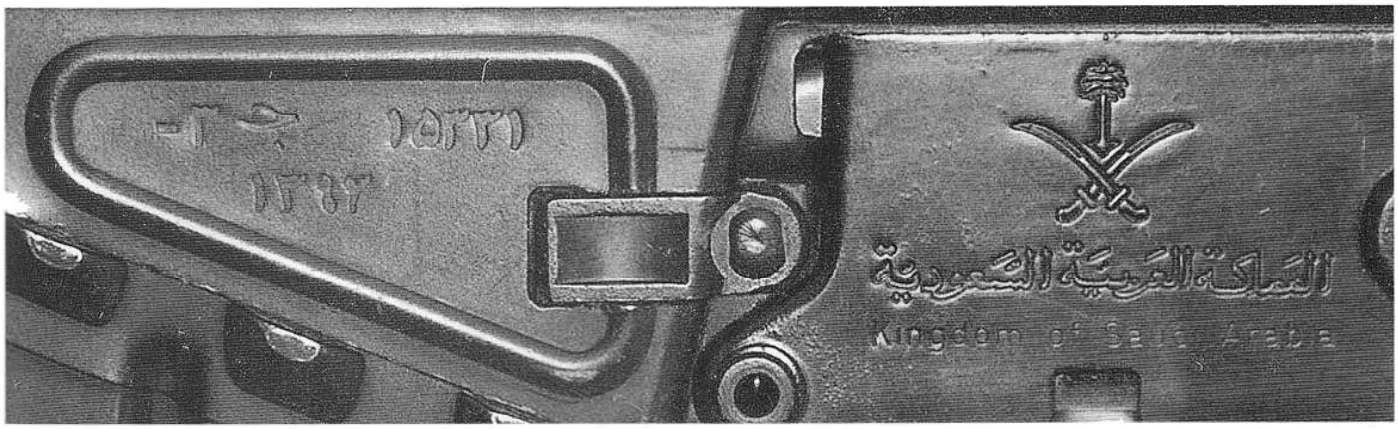
courtesy VS Books/Carl Schulze



536. Left side view of a Portuguese 5.56x45mm "33X" short rifle, serial no 012190, manufactured by FMP in January, 1970. private collection, photo by Richard Jones

Saudi Arabia

537. Left side closeup of a G3A4 rifle produced in Saudi Arabia under licence from H&K.
MoD Pattern Room collection, photo by Reiner Herrmann



538. Left side closeup of the above rifle, showing details of the markings.

The top line reads "-3J" and the serial no "15331". The second line is the date "1397", according to the Muslim lunar calendar (1976). The inscription at right reads the same as the English: "Kingdom of Saudi Arabia".
MoD Pattern Room collection, photo by Reiner Herrmann

As discussed in Chapter Twenty-five, initial production of some 100,000 HK33s was "co-ordinated" at RO Nottingham for Saudi Arabian forces. Saudi Arabia then became a licensed manufacturer of the G3 rifle, with H&K supplying all the tooling, machinery and expertise to the Saudi Al-Kharj Arsenal.

539 (right). Right side closeup of a Saudi Arabian G3A3 rifle, showing selector markings.
MoD Pattern Room collection, photo by Reiner Herrmann

540. Left side closeup of another Saudi G3A3 rifle, showing details of embellishment.

The lengths to which the oil-rich Saudis will go to decorate their weaponry is legendary: on this rifle just about everything removeable, including the flash hider, front and rear handguard caps, cocking handle and operating rod, are gold plated. In addition, as shown here, the magazine catch, selector, trigger, dismounting pins, and rear sling attachment are all gold plated.

The stock is engraved, and the Arabic "Kingdom of Saudi Arabia" legend on the lower receiver is inlaid in green and gold. MoD Pattern Room collection, photo by Reiner Herrmann

541. Left and right side views of a Saudi Arabian MP5K with curved 25-round magazine and flat end cap and swivel replacing any form of buttstock.
MoD Pattern Room collection, photo by Richard Jones

Sweden

The Swedish Trials: a Golden Opportunity to Improve the G3

542. Swedish soldiers carry test G3 rifles through deep snow during a winter trial. The Swedes spent five years in testing the G3 before adopting it in 1965. courtesy Nigel Hinton

The Swedish military adopted the G3 as their *Automatkarbin* 4 (Ak 4) in the spring of 1965, after five years of extensive testing. This period was seen by H&K as offering an opportunity to improve the basic G3 design, which, as discussed in Chapter Seventeen, had not yet been "cast in concrete" by the *Materielamt*. H&K senior weapons technician Karl Schäfer spent three of those years assisting in the Swedish trials, which saw the G3 win out against all competitors.

The original wood-stocked G3 of 1959 had been very much Alex Seidel's "baby", but it so happened that Herr Seidel was busy elsewhere throughout most of the period of the Swedish testing, and it was left to H&K founding director Theo Koch to travel to Sweden to observe the testing. While there Herr Koch, whose pet hobby had long been the marginally profitable H&K machine tool division, instituted a number of improvements to the basic G3. These included the first use of his patented tungsten granule buffer, which was incorporated in two pre-drilled cavities in the bolt carrier (fig 364), and the thumb-operated bolt closure ridges machined into the bolt carrier.

Describing the Swedish-Made Ak 4

Swedish-made Ak 4 rifles accepted for service are identified by the "three crowns" Swedish property mark stamped on the left side of the receiver. Most of the Swedish Ak 4s were produced by the state-owned arms manufactory Carl Gustafs Stads Gevärsfaktori in Eskilstuna, which has been in operation since 1813. These arms are identified by the crowned 'C' emblem stamped on the right side of the receiver, along with the month and year of manufacture.

543. H&K founding director Theodor Koch, from a snapshot taken during the period of the Swedish trials.
courtesy Major (ret) Volker Kurtz

Some Ak 4s were also made by the commercial firm Husqvarna Vapenfabriks AB in 1964 and 1965, before this factory discontinued small arms production (except for shotguns) in 1970. These rifles are identified by the initials 'HVA' alongside the date on the right side of the receiver.

From the second-echelon maintenance and repair manual Ak 4 *Beskrivning del* 2, issued by the *Försvarets Materielverk* in 1980, the Ak 4 is briefly described as follows:

length, w/flash hider:	1,045mm (41")
barrel length:	450mm (17.7")
sight radius:	575mm 22.6")
weight w/empty magazine:	4.8kg (10.6 lbs)
weight w/full magazine:	5.3kg (11.7 lbs)
rear sight gradations:	200, 300, 400, 500m
muzzle velocity (V_0):	800m/sec
theoretical rate of fire:	500 - 600 rpm
practical rate, semiautomatic:	60 rpm
practical rate, automatic:	120 rpm

544. A G3 rifle, equipped with a Hensoldt 4x24 scope in the standard German mount, fires for group in a cold-weather accuracy test during the Swedish trials. The rifle has been randomly taped to help break up its outline against the snow. courtesy Nigel Hinton

545. A winter trial of a retractable-stock G3A1 in Sweden, conducted by German and Swedish personnel.
courtesy the late Karl Schäfer

546. Left side closeup of a G3 rifle manufactured by H&K in January, 1966 as a prototype of the Swedish Ak 4. Sweden purchased the first 10,000 Ak 4s from H&K before domestic production began. Note the change lever markings 'S' 'P' 'A', which are described in the text.
courtesy H&K GmbH, photo by Reiner Herrmann

Other Differences Between the Ak 4 and the G3

547. Left side closeup of Swedish-made Ak 4 serial no 314682.

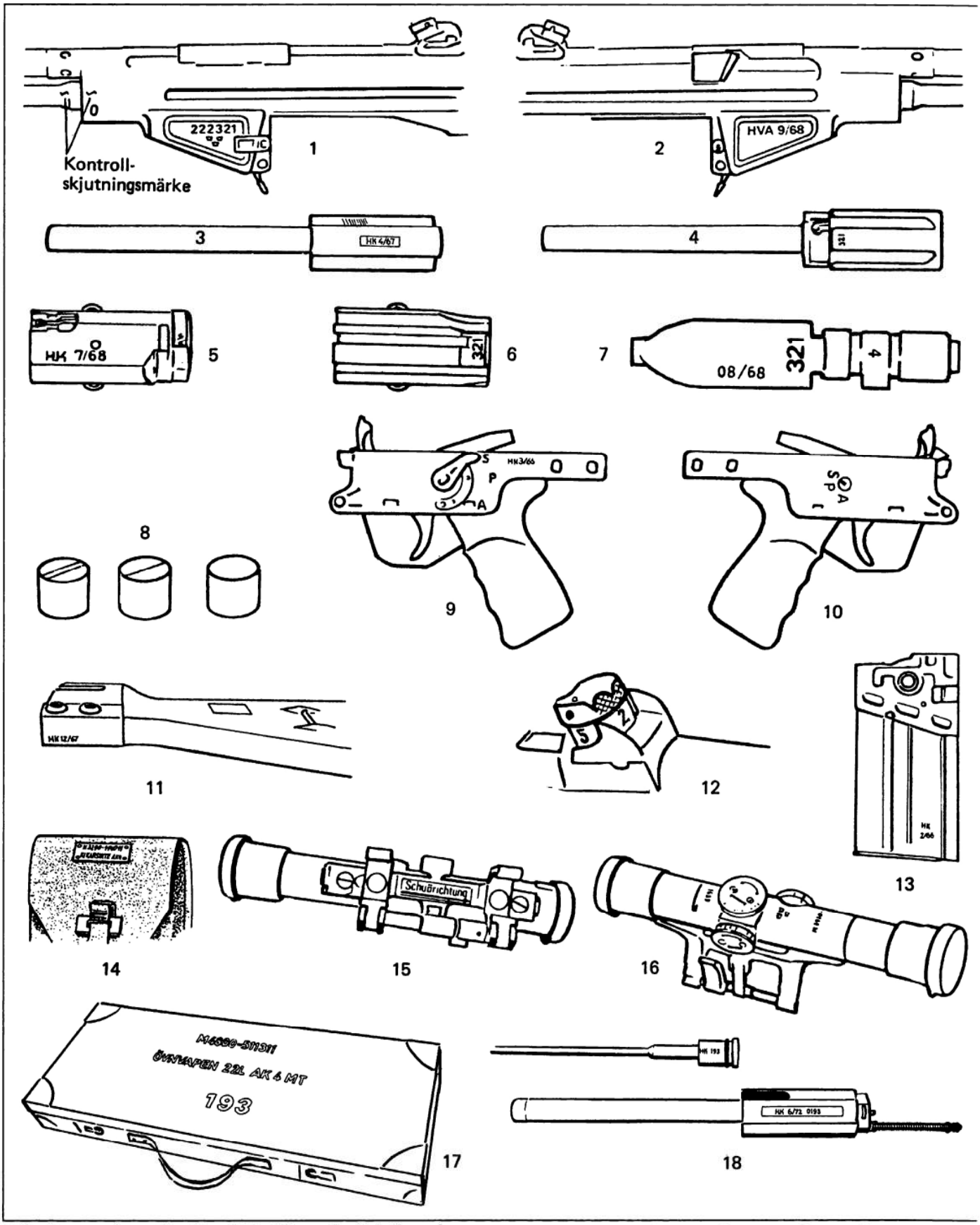
Note the Swedish "three crowns" property mark, and the left side of the fired case buffer, which clamps over the top of the receiver.

courtesy H&K GmbH, photo by Reiner Herrmann

548 (below). Right side closeup of the above Ak 4, showing markings indicating manufacture by the Carl Gustafs Stads Gevärsfaktori in June, 1971.

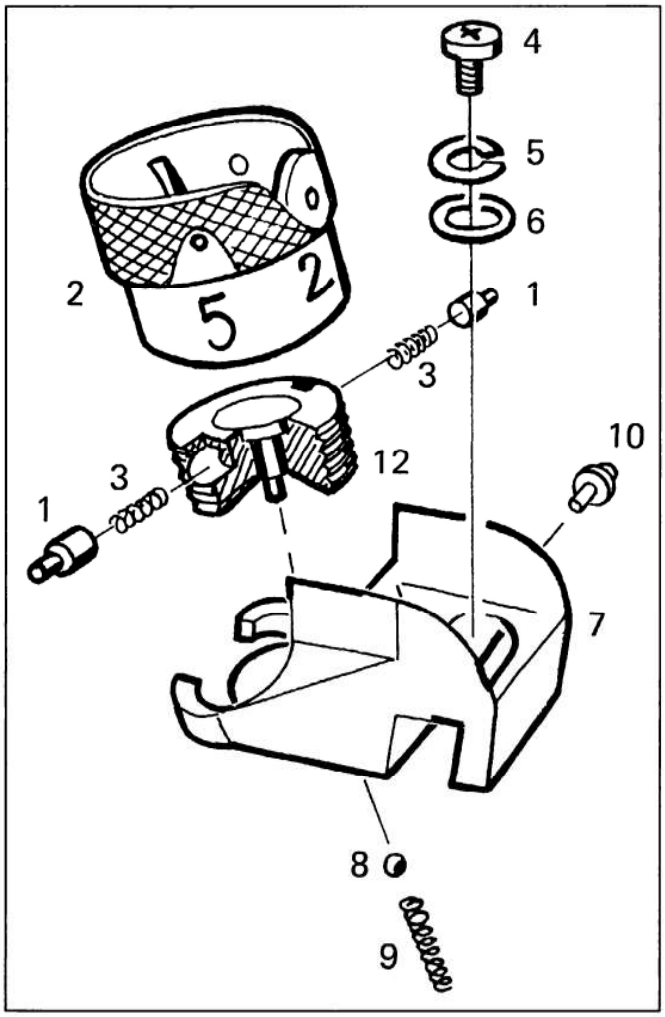
Note the fired case buffer, and the ridges of the thumb-operated bolt closure.

courtesy H&K GmbH, photo by Reiner Herrmann

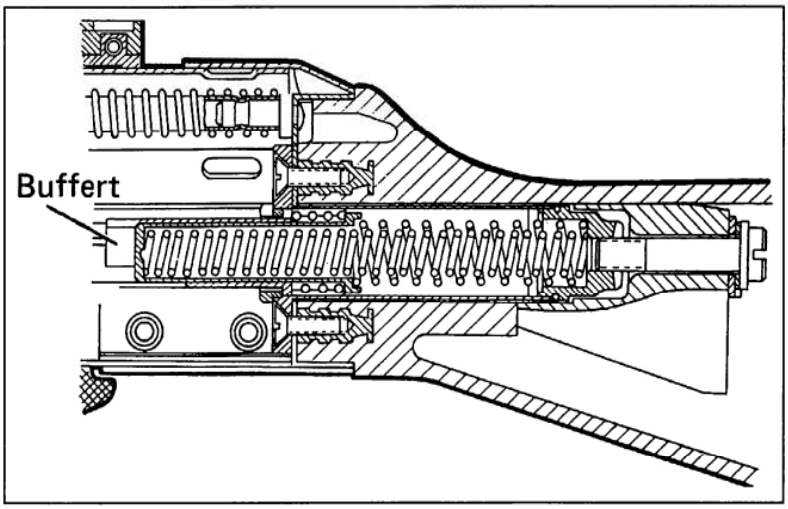


549. A page from the Swedish *Förenade Fabriksverken* (FFV) manual for the Ak 4 rifle, showing the location of markings on the various components. Most of these were taken from early H&K-supplied rifles.

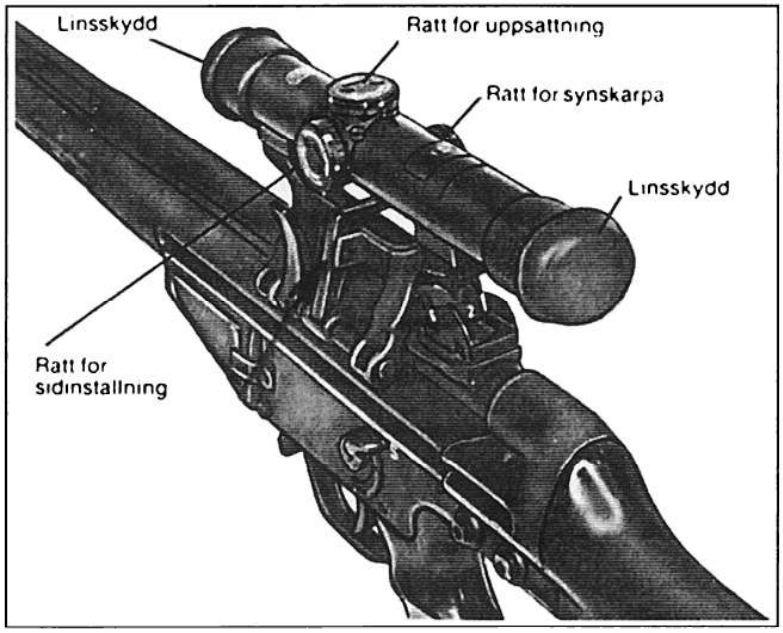
Note (no 2, above right) manufacture by Husqvarna (HVA) in September, 1968; the three sizes of locking rollers (no 8); and the chest for the H&K .22LR calibre conversion kit (no 17). courtesy Nigel Hinton



550. Exploded view drawing of the Swedish Ak 4 diopter rear sight.
Note the absence of the open 'V' notch, and the range gradations from 200 to 500 metres. courtesy Nigel Hinton



551. Left side sectioned closeup of the buffer assembly fitted to the Swedish Ak 4.
Compare with fig 351: the differences are apparent.
courtesy Nigel Hinton



552. An illustration from the FFV manual of the Hensoldt scope and mount, adopted for service use on some Ak 4 rifles. courtesy Nigel Hinton

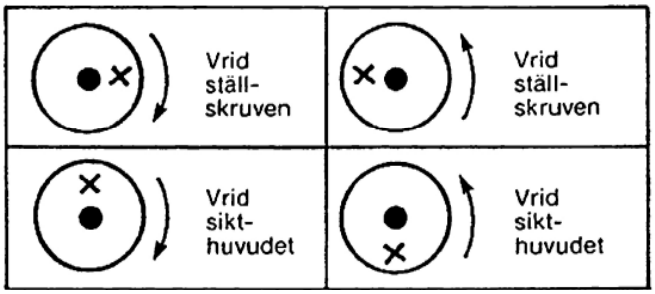
Swedish servicemen being on average taller than their German counterparts, the buttstock on the Swedish Ak 4 was also 25mm (almost 1") longer than the standard G3 stock.

Both the Swedish and Norwegian versions of the G3 rifle were equipped for bayonet attachment by means of the special adapter discussed in Chapter Thirty.

The 'S' 'P' 'A' selector markings on the Swedish AK 4 stand for the following: 'S' = *Säkrad* (Safe); 'P' = *Patronvis Eld* (Single fire); 'A' = *Automatisk Eld* (Auto fire).

As shown in fig 550, the rear sight has no open 'V' notch, with the diopter gradations ranging from 200 to 500 metres. In addition the Ak4 buffer (fig 551) was quite different in construction from the standard G3 assembly.

Finally, a stamped-steel spent case buffer, cushioned by a rubber insert, was provided which wrapped over the top of the receiver and positioned the buffer on the right side just behind the ejection port. The reason for this addition was that the thrifty Swedes routinely collected their once-fired brass, which was then reloaded by such firms as Norma, who were given specific contracts to produce blank cartridges for training use. The case buffers kept the fired ball cartridge cases from becoming dented during the normal ejection sequence, thus making the reloading procedure easier. The Swedish blanks were loaded with wooden bullets, for which H&K designed a special blank firing adapter.



1 »snäpp» i sidled gör ca 60 mm på 200 m
1 »snäpp» i höjdled gör ca 60 mm på 200 m
1 »snäpp» = 1/4 varv

Bild 3:8 a.
Medelträffpunktens förflyttning

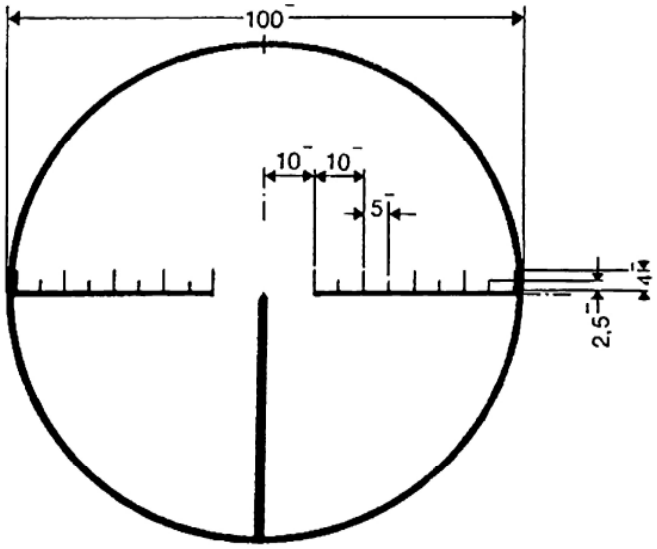


Bild 3:8 b.
Streckplatta

553. Drawings from the FFV manual illustrating the reticule (*Streckplatta*) of the Hensoldt 4x24 scope sight adopted for Swedish service use, right, and instructions for windage (*ställskruven*) and elevation (*sikthuvudet*) adjustments. courtesy Nigel Hinton

Thailand

The Royal Thai Armoury still manufactures the HK33 on a low scale, and Thai forces are the last to stock and issue the long 40-round magazine.

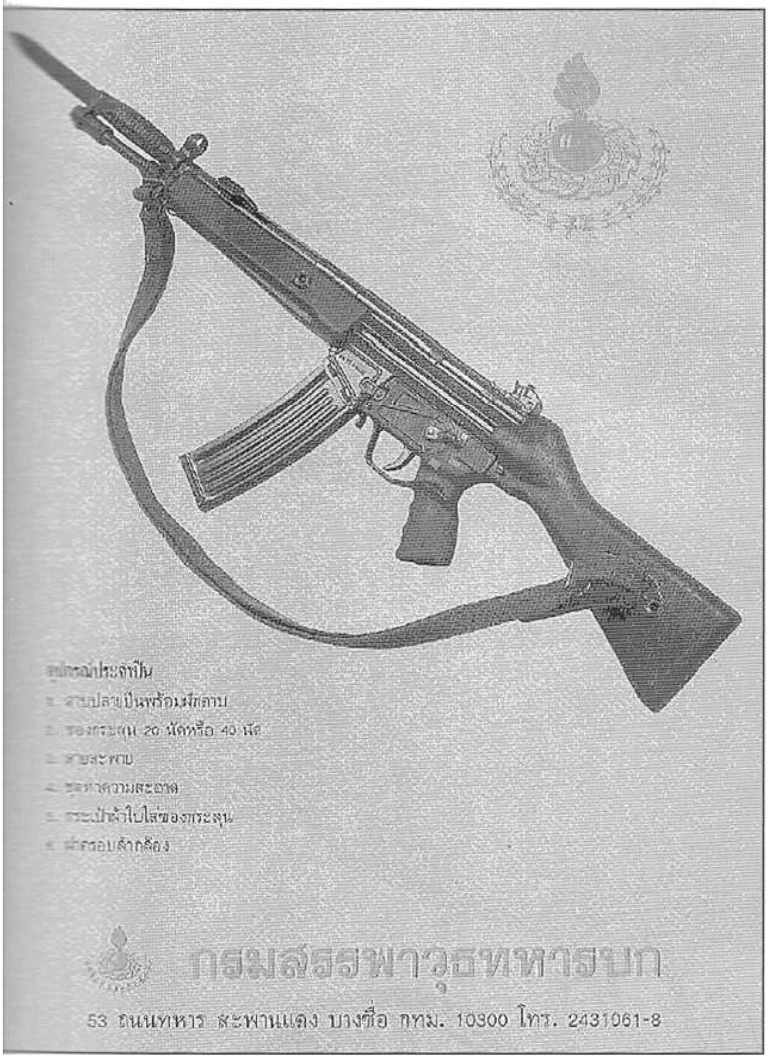
An "insider's" look at the early days of the Thai HK33 programme, before domestic manufacture began, is provided by the then Executive Director of the Pan Asia Systems Consortium in Bangkok, Thailand, in an interesting letter written in 1973 to another arms merchant, the Armour & Engineering Corp, located in Kuala Lumpur, Malaysia. This letter, which was provided to the author by the late Dr Edward C Ezell, is excerpted as follows:

. . Only six months ago [we] were of the opinion that Fabrique Nationale Herstal SA (FN) in the long run stood a good chance of gradually taking over the small arms market in Thailand. However since then [we] have noticed a gradual deterioration in ASSOCON's position as the representative of FN. This has taken place even though there has been dissatisfaction within the Police Department with the Heckler & Koch HK33. In mid-June [1973] the Thai Police Department was ordered by the Minister of the Interior (who is also the Director-General of the Police Department) to purchase 2,900 HK33s. In passing down this order the Minister told the Police that as the Royal Thai Army will soon be producing the HK33 rifle, the Police should standardize on the same weapon.

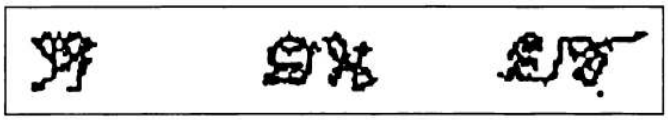
This is quite a departure from previous Police plans, as in the General Standardization Plan for the Police Department the previous choice for arming the Provincial Police was the FN CAL, [which was] selected as the standard weapon for the Border Patrol Police.

Pressure on the Police to accept the HK33 started in 1970, when the Police were forced by the Supreme Command to purchase 1,000 HK33s. This lot was turned over to the Border Patrol Police in 1971. Since that time there have been numerous complaints by the Border Patrol Police of malfunctioning and defective parts in these HK33 rifles. (NOTE: In general malfunctions are in ejection and the failures are mostly in external parts coming loose or breaking down. The most serious complaint has been the loosening of the pin that holds the barrel to the receiver, resulting in the barrel "unseating". There have been several reports that the barrels have actually come off the receiver, but these reports appear somewhat exaggerated).

In June, 1973 the Deputy Commander of the Border Patrol Police personally appealed to the Chief of the Quartermaster Division, requesting him to authorize the replacement of the 1,000



554. A single-page colour brochure describing the HK33 manufactured in Thailand.
courtesy Wolfhart Fritze, FGS Frex Ltd



555. A bitmapped drawing of the selector markings found on the Thai-manufactured HK33.
From left: Safe, Semi-automatic, Automatic.
courtesy Wolfhart Fritze, FGS Frex Ltd

HK33s on issue to the Police with the FN CAL rifles. This request was turned down.

Unfortunately within the Thai Army there is a strong reticence among the officers to discuss, even on an informal basis, deficiencies in the field performance of the HK33. As far as we can determine no official report on defective parts and malfunctioning of the HK33 rifle has been published by the Army. However, technicians from the Heckler & Koch factory in West Germany have been brought to Thailand on several occasions to "solve problems" with the HK33. During one of these visits the Heckler & Koch technicians apparently replaced springs in the HK33 bolt mechanism to correct ejection failures.

The "love affair" of senior officers of the Royal Thai Army with Heckler & Koch reached its high point in 1969, when arrangements were concluded with Heckler & Koch for the delivery of 15,000 complete HK33 rifles, the subsequent supply of parts for an additional 25,000 HK33s, and plans for the ultimate manufacture in Thailand of 30,000 more HK33s. In fact, by late 1971 an Agreement was concluded with Heckler & Koch for the construction of a plant for the assembly and manufacture of the HK33 at a price rumoured to be in the neighbourhood of US $15 million.

. . Necessarily we feel that what successes Heckler & Koch have achieved in Malaysia and Thailand are the results of unprecedentedly high bribes being paid. Recently we feel that the Germans have organized a sort of cabal to co-ordinate their activities and to [promote] further sales in Southeast Asia. This includes close co-ordination among Heckler & Koch, Dynamit-Nobel, Fritz Werner and WASAG-Chemie. We have noticed the impact on other aspects of our operations.

. . for an indeterminate period FN sales may drop in Thailand. At one time we were quite optimistic that we would be able to market 500 FN MINIMI MGs in Thailand. However, with the way Heckler & Koch are now manipulating things behind the Police scenes, we believe this is no longer an achievable goal . .

A short article clipped from the Bangkok *Post* of August 20, 1973, appended to this letter, reads as follows:

Armoury delays gun production

The Royal Thai Armoury will be completed next month but production equipment will not be installed until next year.

Although the German-supplied equipment has been arriving at the army factory, production of the first batch of rifles also will be delayed until next year.

Several Royal Thai Army technicians are learning up-to-date methods of arms production in Germany.

Rifles, including the barrel, will be made at the factory, other weapons will be produced later.

Turkey

556. Right front three-quarter view of the "Silahsan Auto Rifle G3A3" as manufactured by MKE in Turkey.
courtesy MoD Pattern Room Library

The state-owned Fritz Werner (FW) machine tool company also brokered the deal to set up G3 and MG3 production in Turkey after the German MoD had granted the licence. The H&K identifier for the Turkish-pattern G3s was 224040.

A compilation of information excerpted from *Jane's Defence Weekly* of September 23, 1995 informs us that at that time Turkish soldiers and marines were equipped mainly with up to 350,000 G3A3 (fixed butt) and G3A4 (retractable butt) rifles, produced under licence since 1967 by the Silahsan weapons factory, a division of the state-owned Makina ve Kimya Endüstrisi (MKE) Kurumu in Ankara, although quantities of FN FALs were also in service. Among these were many ex-*Bundeswehr* FN G1s.

MKE

MAKİNA ve KİMYA ENDÜSTRİSİ KURUMU

SİLAHSAN HAFİF SİLAH SANAYİ ve TİCARET A.Ş.

557. The MKE logo and name Kimya Endüstrisi Kurumu taken from an MKE G3A3 brochure.
courtesy MoD Pattern Room Library

Describing the Turkish MKE G3

558. Left side view of the Turkish G3A4, manufactured by MKE, with retractable stock extended.
NMAH photo by Eric Long, courtesy the late Dr Edward C Ezell

559. Left side closeup of the above Turkish G3A4, serial no 4930, manufactured by MKE in November, 1978, with retractable stock closed. NMAH photo by Eric Long, courtesy the late Dr Edward C Ezell

A brief MKE brochure titled "7.62mm Infantry Automatic Rifle G3" describes the Turkish G3A3 and G3A4 as follows:

Length, G3A3: . . . . . 1,020mm (40.4")
Weight, G3A3, empty: . . . . 4.25kg (9.4 lbs)
Length, G3A4 w/stock retracted: 840mm (33")
Weight, G3A4 empty: . . . 4.52kg (9.96 lbs)
Weight, magazine w/20 rds: . .75kg (1.65 lbs)
Barrel length: . . . . . 450mm (17.7")
Sight radius: . . . . . 572mm (22.5")
Rate of fire, approx: . . . . . 600 rpm
Muzzle velocity (V_o): . . 2,624 fps (800m/s)
Muzzle energy (E_o): . . . 2,170 ft lb (3,000J)
Number of parts, G3A3: 187
Number of parts, G3A4: 190
Barrel life: . . . . . 6,000 rounds
Maximum range: . . . . 3,700m (4,046 yds)
Effective range: 400m
Rifling twist: 1 turn in 305mm (12") right hand
Number of rifling grooves: 4
Number of chamber grooves: 12
Standard equipment: magazine, sling, bayonet

560. A photograph taken in western Turkey during the AMF(L) exercise "Alley Express 92", showing a Turkish soldier of an artillery unit armed with a G3A3 manufactured under licence by Kimya Endüstrisi Kurumu (MKE).
courtesy VS Books/Carl Schulze

561. A photograph, taken in the summer of 1996 [illegible] soldier from the Turkish IFOR contingent in Bosnia, armed with an MKE G3A3.

The AFV in the background is based on the M[illegible] manufactured by FMC-NUROL Savunma Sanayii Defe[illegible] Systems in Turkey. courtesy VS Books/Carl Sch[illegible]

562. Right side view of an HK33E/A3 with stock retracted, fitted with a T-40 40mm grenade launcher.
This entire package is manufactured by MKE in Turkey.
MoD Pattern Room collection, photo by Richard Jones

563. Left side closeup of the above HK33E/A3, showing markings denoting manufacture in 2004.
Note the MKE markings on the T-40 grenade launcher.
MoD Pattern Room collection, photo by Richard Jones

MKE Goes Commercial

As described on the website <www.mkek.gov.tr>, MKE have currently expanded their product line to include a plethora of full- and semi-automatic weapons and sporting arms, in calibres 7.62x51mm, 5.56x45mm and 9x19mm, all based on the standard H&K roller lock action and available commercially in a wide variety of models, barrel lengths, and finishes.

As shown above, MKE has been producing the HK33 under licence from H&K in the past several years. Military and police models also include a complete series of MP5 submachine guns with various barrel lengths and stock types, as well as four silenced versions.

564. A photograph taken at the 2006 IWA Show in Nuremberg of a display of Turkish-made MKE products.

Left: two versions of the semi-automatic .223 hunting rifle (above); plus two versions of the semi-automatic 7.62mm MKE-T41.

Right: two 9mm MKE-T94 "hunting rifles" with retractable and fixed buttstocks, and a semi-automatic heavy-barrelled target version of the 5.56mm rifle.

photo by Richard Jones

Chapter Twenty-five

Marriages of Convenience

Introduction

Traditionally in Germany, the sale of weapon parts to customers abroad was seldom if ever subjected to the same degree of red tape that accompanied the export of complete arms. Even in the latter case, under the postwar German War Material Act export licences were not difficult to obtain until 1970, when the Social Democrats were voted into power on a platform of peace and neighbourly responsibility. Suddenly the restrictions on foreign arms sales were tightened dramatically, and German arms firms began to suffer in the highly competitive world marketplace. It was then that the methods, which had stood such firms as Mauser in such good stead in the past, were again dusted off.

Doing It "The Walther Way" in France

Assembly at *Manufacture d'Armes de St Etienne* (MAS)

An initial opportunity for circumlocution arose, interestingly, in West Berlin, where the police wanted to obtain some MP5s and G3 rifles. However, due to the special Allied status of the enclave, which was completely surrounded by Soviet-controlled East German territory, the supply of weapons from West Germany to Berlin was against the law. West German officials therefore suggested to H&K that they do it "the Walther way".

This referred to the method whereby Walther had supplied the West Berlin authorities with PP and PPK pistols, as well as P38s and MPK and MPL submachine guns, all assembled and marked "Made in France" by Walther's French licensee Manufacture de Machines du Haut-Rhin (Manurhin).

H&K accordingly instigated a search for a suitable partner in France, which resulted in their teaming up with the idle state-owned arsenal *Manufacture d'Armes de St Etienne* (MAS) in St Etienne, which for a very welcome price was only too happy to take on the assembly of German-made components into complete G3s and MP5s, marking them "Made in France".

Soon a French military train left for Berlin, travelling through the DDR (German Democratic Republic) with no unwonted inspection, and the West Berlin police had their weapons.

In 1974 H&K even hoped to win the competition for the new 5.56mm French Army rifle, pitting their new, improved HK33F against the M16 and FN CAL. The HK33F actually won the competition hands down, but such a choice was deemed politically unacceptable in France, and it was decided that a French rifle had to be designed. The result was the hesitation-locked FAMAS, which eventually became the standard French rifle but was not at all a success on the export market.

The G3 Finds a Place in the GIAT Export Catalogue

565. Left side closeup of G3 rifle marked "CO F", serial no 19376, fitted with plastic furniture and an aluminum magazine.

As shown in fig 566, this rifle was assembled at MAS (St Etienne) in July, 1974.

MoD Pattern Room collection, photo by Reiner Herrmann

The French were very appreciative of the financial windfall which the G3 assembly programme represented and, having no modern submachine gun or rifle in production for export to the *Communité Française*, they quickly included the "MAS-made" G3 and MP5 in their export catalogue.

Issued by GIAT headquarters at 10, Place Georges-Clémenceau in St-Cloud, the GIAT brochure for the "FA (*Fusil Automatique*) G3 7.62mm" described the standard plastic-stocked G3A3, a "marksman's" version equipped with a telescopic sight, and the G3A4 with retractable buttstock, intended for use by parachutists and armoured divisions.

Under the heading "General Characteristics" the rather fractured English-language text of the dual-language (French and English) GIAT brochure contained a thinly veiled criticism of the FN FAL, stressing the fact that due to its simplified construction (i.e. stamped rather than expensively machined), the G3 was available at a lower price, which was of course an important consideration in Third World countries:

566. Right side closeup of the above rifle, showing markings.

While this rifle was merely assembled at MAS in July 1974, it is marked "Made in France".

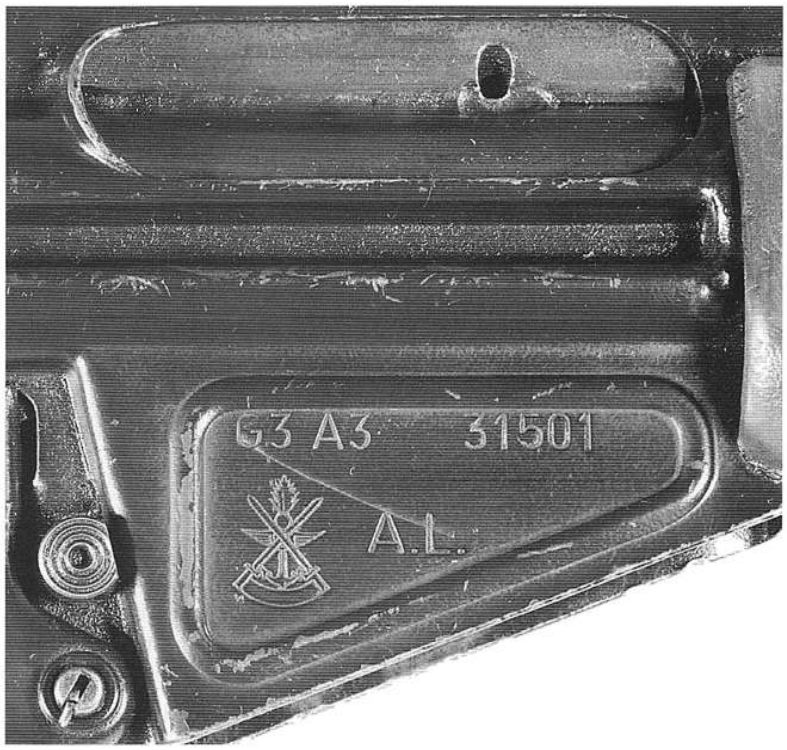
MoD Pattern Room collection, photo by Reiner Herrmann

. . The very modern design of this gun permits to simplify considerably the industrial operations of manufacturing, i.e. in short, to noticeably lower its price, with respect to weapons of a conventional design.

For that reason on the world market, the G3 gun, as well as being amongst the most modern of weapons, benefits from the lowest price, which is a very important element in the choice of a gun, which all countries must acquire in very large quantities.

Lebanon was a key purchaser of G3s from MAS. According to the second edition of *Small Arms Today*, Lebanon also purchased some Enfield-assembled G3s, and a small number of HK21 LMGs.

Other countries acquiring H&K G3s from MAS include Haiti, whose G3A4s were assembled in St Etienne, Senegal, possibly Togo and Uganda, and Upper Volta.



567. Right side closeup of a G3A3 rifle assembled at MAS, serial no 31501, marked with the crest and initials of the Lebanese Army (A.L.) courtesy Virginia Ezell

The Enfield Connection

Initial Discussions

The "Enfield connection" was begun during the course of some casual discussions in early 1970 at the Meppen *Erprobungsstelle* (Proving Ground) between H&K designer Rolph May and Bill Osborne, the British 4.85x49mm Project Manager at the RSAF Enfield Design Department. On his return to Enfield, Bill Osborne reported to the RSAF directorship that conditions seemed favourable for some sort of co-operative arrangement between H&K and Enfield.

H&K director Alex Seidel then invited Roy Stainton, the director of RSAF Enfield, to Oberndorf, ostensibly to be updated on the state of the developmental British 4.85mm cartridge programme. At that time discussions were held regarding the political scene, wherein Herr Seidel confided that H&K was being constrained by extremely tight German government regulations regarding the export of its products.

To this Mr Stainton replied urbanely that as a part of the British Ministry of Defence, RSAF Enfield enjoyed a much less stringent government overview regarding where and to whom it could export its products.

Perhaps he also mentioned that the L1A1, the British-made inch-measurement version of the FN FAL rifle, was by this time out of production, although certain potential customers for arms from Britain, mainly in the Middle East and Africa, still existed.

Circumventing German Export Restrictions

Since the German government would have no qualms about approving deliveries of weapon parts to the British MoD, a similar licensing agreement to that signed with the French MAS state arsenal was arranged between H&K and the British MoD, representing RSAF Enfield.

The H&K Programme at RSAF Enfield

Initially G3 Assembly Only

By 1972, with the consent of the British and German governments, H&K had established a programme at RSAF Enfield, whereby British workers would assemble German-made components, then proof and mark them. The only parts actually manufactured by Enfield at first were the firing pin and the bolt rebound catch, which was, amazingly, enough "British content" to allow the assembled arms to qualify as British-made products.

The world was soon divided up into "spheres of influence", with the UK representing H&K in English-speaking African countries and in the then "Trucial States" (Oman, etc) in the Middle East.

Serial number blocks were assigned to Enfield from the H&K serial number book. For the first five to ten years there was a duplication of serial numbers, with Enfield marking the G3s they "produced" with the same numbers being used by H&K.

568. Left side closeup of G3A3 serial no 6006292, showing markings indicating assembly at RSAF Enfield in 1972. MoD Pattern Room collection. photo by Reiner Herrmann

The Proof and Function Testing Procedure

A series of 22 steps were required to be performed in the examination, proofing and function-testing of each completed G3 rifle at RSAF Enfield. These were laid down as follows:

Rifles 7.62mm G3

Each rifle will be submitted to the following tests:

Examination before Proof

1. *Check serial number on Body.*
2. *Cock action of rifle and clean bore.*
3. *Check that running plug 7.61mm passes through bore and 7.65mm is rejected.*
4. *Check with Change Lever at "Safe" that mechanism will not actuate.*

High Pressure Proof

5. *Check that bore and breech are free from obstruction - Place rifle in proof mount and fire two (2) 7.62x51mm German High Pressure Proof Rounds (see standing instructions for Proof firing).*
6. *Place fired Cartridge Cases in plastic bag.*
7. *Stamp Proof Mark on Body and Barrel on right hand side - stamp safe barrel mark adjacent to Proof Mark . .*

Examination After Proof

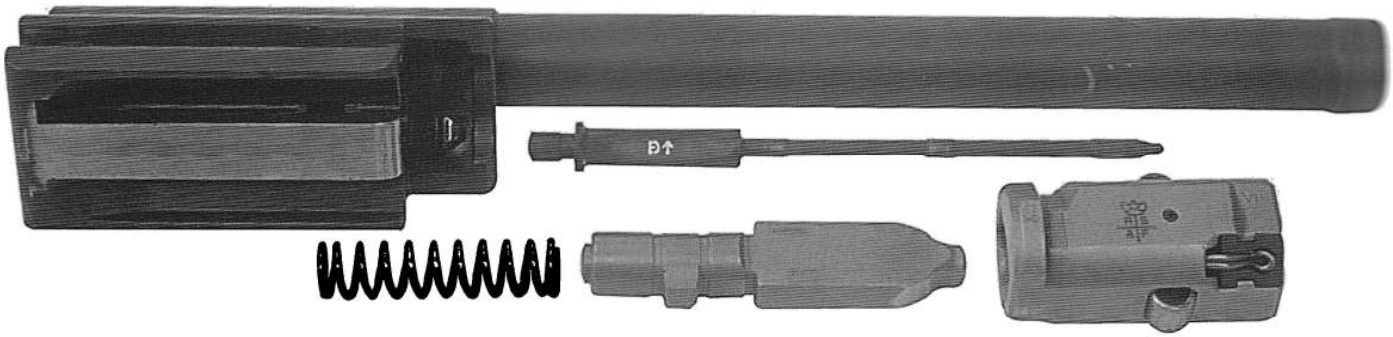
8. *Check that Rifle is clear of live ammunition.*
9. *Clean bore - check with running plug 7.61mm and that high size plug gauge 7.65mm is rejected.*
10. *Examine barrel, body and breech mechansim for damage and distortion caused by Proof firing.*
11. *Examine fired proof cartridge cases for stretch deformation or damage, and concentricity of strike of the firing pin.*
12. *If all is satisfactory check that proof and safe barrel marks are stamped vide para. 7 above. Note - any component (i.e. Barrel or Body) that on examination is found to have failed proof will have the proof and safe barrel marks barred out and the weapon labelled as rejected.*

Functioning Test at 30 Metres Range

13. *Examine rifle to see that bore and chamber are clear.*
14. *Place in rest and load with a full magazine.*
15. *With sights set at 200 metres and change lever at single shot (E) fire three (3) rounds.*

569. Left side closeup of undated G3A3 rifle serial no 6699803, showing "EN" assembly marking. Note the selector markings "S E F", and the non-standard plastic magazine. MoD Pattern Room collection, photo by Reiner Herrmann

570. Left side closeup of undated G3 rifle serial no 6738419 marked "EN Cal .308". Note the selector markings "0 1 20", and the experimental large-capacity magazine.
MoD Pattern Room collection, photo by Reiner Herrmann



571. Bolt assembly from an Enfield-assembled G3 rifle.
An RSAF proof mark is etched on the bolt head, right, but the only component of British manufacture is the firing pin.
MoD Pattern Room collection, photo by Reiner Herrmann

Place change lever to automatic (F) and fire seven (7) rounds in two bursts. The rifle must feed, fire, extract and eject without stoppages during this test. All malfunctioning must be recorded on card and the rifle rejected.

16. *Measure gap between carrier and Breech Block face .35mm Low Limit, .45mm High Limit. Record result on card. Reject rifle if gauge is rejected on low limit or accepted on high limit.*

Zeroing and Accuracy Tests at 30 Metres Range

17. *Sights set at 200 metres and change lever at Single Shot (E) fire sighting shots - adjust backsight as necessary with tool supplied so that MPI is within a circle of 2.4cm. The centre of which is point of aim.*
18. *When zero is correct fire five (5) rounds single shot - the group must be within a circle of 4.2cm and the MPI within a circle of 2.4cm. The centres of both being the point of aim.*
19. *Record diagram number of target and required number of rifle on I.Arm. Form M.607.*
20. *Clear rifle and remove from rest -oil barrel.*
21. *Targets will be submitted to the Range Office at end of day's output.*
22. *Pass rifle to engraver for engraving of Breech Block components to rifle, and the Proof Mark on Breech Block adjacent to number.*

More British Content

572. Left side view of a British-assembled version of the ill-fated HK G41K rifle.
As discussed in Chapter Twenty-one, the 5.56mm G41 was never adopted anywhere.
MoD Pattern Room collection, photo by Richard Jones

573 (right). Left side closeup of the above G41, serial no 6744235, showing markings indicating British assembly.
MoD Pattern Room collection, photo by Richard Jones

574. Right side views of three models of HK33K submachine guns. Various versions of this type of weapon have been assembled in the UK and used in British service for over the past fifteen years.

Above: tentatively identified as the L93A1.

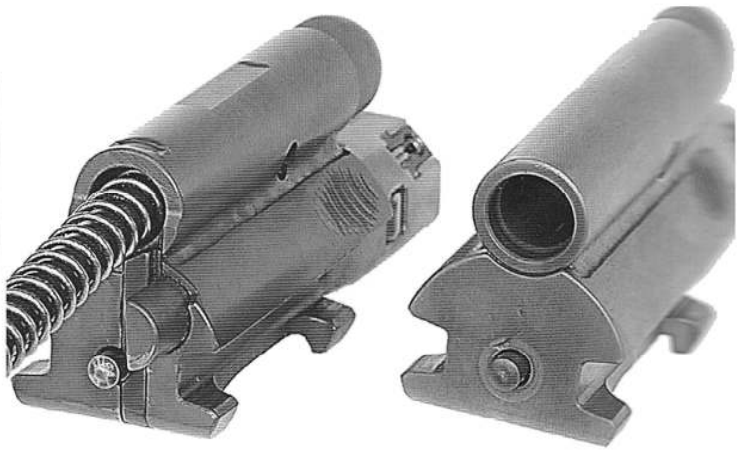
Centre: tentatively identified as the L101A1.

Below: the L101A2.

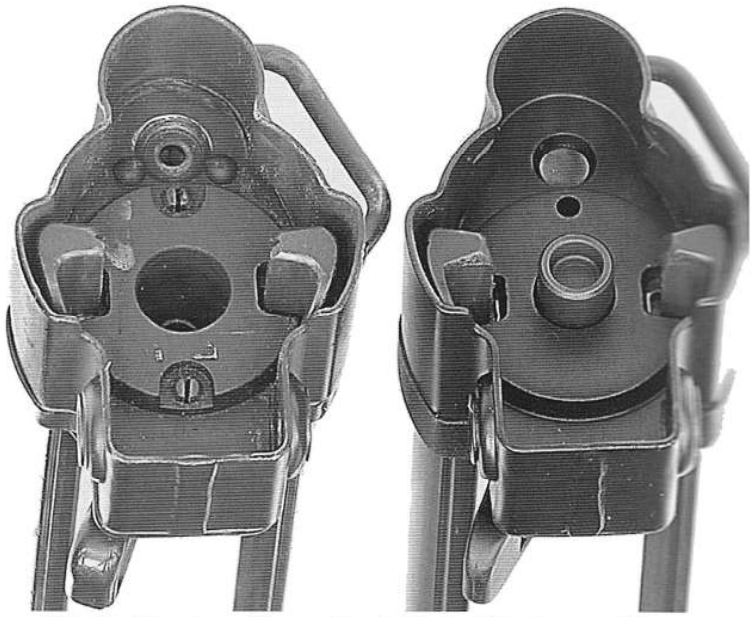
Endurance problems have been experienced with the single crosspin attachment of the retractable butt group, which has been identified as a weak point of this design.

MoD Pattern Room collection, photo by Richard Jones

575. Right side closeup of the British service L101A2 (HK33K) shown in fig 574.
Note the NSN number shows the country code as "99" (UK).
The left side of the magazine well is unmarked.
MoD Pattern Room collection, photo by Richard Jones



576. Rear view of two bolt assemblies.
Left: tentatively identified as the L93A1. Note the crimped-in return spring assembly and the spring-loaded buffer, an attempt to keep this powerful but compact arm from shaking itself to pieces on sustained fire.
Right: L101A2.
MoD Pattern Room collection, photo by Richard Jones



577. Inside view of two retractable buttstock assemblies.
Left: tentatively identified as the L93A1. Note the impact mark of the buffer unit shown above.
Right: the more robust L101A2, with central ring buffer
MoD Pattern Room collection, photo by Richard Jones

Eventually an expanded number of G3 parts were manufactured in the UK. Due to a production bottleneck in Germany, G3 barrels were made at Enfield (and also sourced from Sweden), with H&K supplying on loan the machinery needed to cut the chamber flutes in the Enfield-made barrels. However the Germans found that the British barrels were much more expensive than the equivalent product made in Oberndorf, and were thus not too happy about this aspect of production-sharing.

No plastic furniture was ever made in the UK - the British would buy the stocks, pistol grips and forearms in from H&K or from other countries licensed to produce the G3, such as Greece or Turkey.

H&K Moves to RO Nottingham

In 1988 the small arms production capability and a small part of the workforce at RSAF Enfield were relocated to a new facility alongside the traditional manufactory of large naval and field guns at RO Nottingham, where an entire separate department of workers was devoted to the production of H&K products. Initially they worked with what were known as "Slap Kits", which were sets of in-the-white bodies and other unassembled components imported from Germany. The workers at RO Nottingham would assemble the weapon, install the barrel, affix the serial number, proof the weapon, and paint it.

Meanwhile in Germany, it was hoped by H&K and its creditors that the R&D contract which produced the 4.7x32mm caseless cartridge and the futuristic G11 rifle, which was funded by the German government, would result in big business for H&K. However by 1991, with the end of the cold war, the German Army no longer needed vast quantities of any new rifle, and the lines of credit that H&K had

been relying on were cut. It was at this juncture that Royal Ordnance (British Aerospace) moved in to purchase Heckler & Koch which, as noted in Chapter Twenty-one, then became "a company of British Aerospace Defence". The HK33E (fig 436) was one of the models produced during this short-lived liaison.

In late 1992 the RO Nottingham factory converted from production of the controversial British SA80 "bullpup" rifle and turned its attention to a contract to manufacture 40,000 HK33s for South American countries, plus 800 belt-fed HK21s.

The entire RO Nottingham site was closed in late 2001 and, as had been the case earlier at Enfield, the land on which it had been situated was slated for redevelopment. As author Steve Raw concludes bitterly in his 2003 Collector Grade title *The Last Enfield*, "Where once the big guns of the British Army and Royal Navy were made, a retail development now stands."

Countries Acquiring UK-Assembled H&K Products

578. Left side closeup of a 7.62mm NATO calibre rifle resembling the HK33E (fig 436), marked "GR 7 17 A 609/Cal 7.62x51/EN". Both metal and plastic furniture are sand-coloured.

Note the integral 1.5x optic sight, and the four-position selector with pictogram markings.

A small number of these rifles were procured by Abu Dhabi. courtesy H&K GmbH, photo by Reiner Herrmann

Countries acquiring H&K products assembled in Britain include Abu Dhabi, which took delivery of some EN-marked sand-coloured "GR7"s fitted with permanent 1.5x optic sights; Qatar, which acquired some G3s assembled at RSAF Enfield; and Saudi Arabia, which was licensed to produce the G3 in 1968. When later there was a large demand for G3s, which the Saudi factory in Al-Kharj could not meet, a quantity of H&K G3s and MP5s were purchased from RSAF Enfield.

Tanzania acquired some HK33s and G3s, although the origin of these is uncertain. Additionally, Uganda, Zaire and Zambia acquired G3s assembled at RSAF Enfield.

Part VIII: A Modern History of the Spanish CETME

Chapter Twenty-six

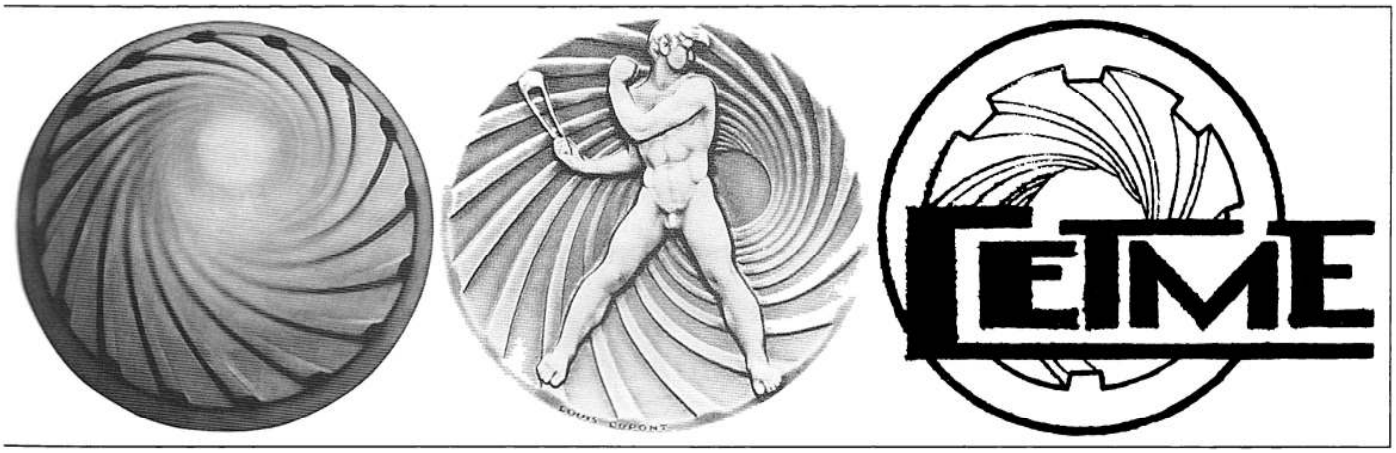
Military Models A Through LC

Establishing a Production Capability at CETME

579. The letterhead of the CETME Design Establishment in Madrid. Reflecting the fact that CETME had now acquired its own manufacturing capability, the "C" in CETME now stands for *Compania*, not *Centro*.

Note the interesting gun-barrel logo at left, the origin of which is suggested below.

courtesy the late Dr Edward C Ezell



580. A series of mutations on the "gun-barrel" theme used in the CETME logo.

Left: a view down the bore of a 40mm Bofors AA gun, manufactured by FN under a licence obtained from Bofors Aktiebolaget in 1936. This photo appeared in the company history *Fabrique Nationale d'Armes de Guerre SA, 1889 - 1964*.

Centre: from the same book, a photo of an FN medallion based on the same theme, designed by Louis Dupont.

Right: a closeup of the CETME logo.

author's collection

581. An impressive display of arms affixed to a wall in the Santa Bárbara offices in Madrid.

From top: CETME Sport (Chapter Twenty-seven), CETME E, CETME C, CETME B, CETME A, an original *Modelo* 2 (Chapter Ten), and the obvious inspiration for the entire series, a WWII StG44. courtesy Terry Gander

Returning to the year 1957, *Dipl-Ing* Werner Heynen's account continues the history of the CETME rifle in Spain with the watershed decision to erect an assembly factory as part of the CETME design establishment in Madrid, and records the initial adoption of the Model A CETME rifle by the Spanish Army, as follows:

> . . *Spanish officials had followed with great interest the various co-operative activities of CETME and the German Defence Ministry, and the resulting changes to the weapon. They were also engaged in a programme of testing and trials, the results of which indicated that it was time to erect a shop for production of the expected orders for weapons or parts of weapons. The actual construction of such a building, and the education of the necessary personnel was expected to take a certain amount of time, particularly since much of the necessary machinery had to come from foreign countries. Due to an order of the INI that CETME should be made capable of filling expected orders from Germany, the Council of Ministers approved an amount of 20 million Pesetas on August 26, 1956. This decision marked the beginning of the present CETME factory. In January 1957, 100 weapons were given to the* Escuela de Aplicación y Tiro *for tactical organisational trials.*
>
> *The* Diario Oficial del Ministerio del Ejército *no 214 published the decree of September 20, 1957, according to which the CETME [Model A] assault rifle was declared the standard weapon for the Spanish Army. The Naval Ministry followed with a similar declaration on January 16, 1958, and the Air Force on July 26, 1958. The Policía Armada also declared that the weapon had been tried and tested with success, and that it was also ordering its introduction. Negotiations were under way with the Ministry of the Army regarding the possibility of a production contract.*
>
> *Production of the first series of 5,000 weapons, of which the first 500 [sic: 400] were assembled and tested in Germany [Chapter Twelve], began in Spain towards the end of 1957 with increased speed due to the unrest in Sidi Ifni [discussed below]. This offered a unique opportunity for real practical experience under the difficult conditions of desert warfare. By February 18, 1958, 815 weapons had been delivered. One of the co-workers was sent to the troops for the purpose of instruction, and the weapons themselves were accompanied by a brief manual. The handling and the clearing of possible stoppages was explained. In addition, preprinted sheets with which to report experiences were handed out. Delivery by this time was running at 400 rifles per month.*

Describing the CETME Model A, in Calibre 7.62x51mm "CETME-NATO"

As discussed in Chapter Eleven, in 1955 the Spanish updated the original *Modelo* 2 7.9x41mm CETME assault rifle and produced a new model, chambered for the slightly less powerful calibre 7.62mm "CETME-NATO" cartridge, called the Model A (figs 164 and 175).

The typescript monograph *Fusiles de Asalto CETME* continues with a brief description of the CETME Model A, as follows:

> . . *The CETME Model A rifle, which entered production in 1956, was essentially the same as the original Model 2, with modifications to the barrel and other minor changes to adapt it to the CETME-NATO cartridge. A carrying handle was also incorporated in the Model A* . .

Technical Data on the CETME Model A

The German-language handbook *Kurzbeschreibung des CETME-Gewehres Kaliber 7,62mm* contains the following technical data regarding the CETME Model A rifle:

Length, with flash hider: . . . . . 1,000mm (39.4")
Weight, without magazine: . . 4.850kg (10.7 lbs)
Weight of 20-rd magazine, empty: . . 400g (.88 lb)
Weight of 20-rd magazine, full: . . 830g (1.83 lbs)
Barrel length: . . . . . 450mm (17.7")
Rifling: . . . . . 4 grooves, right hand
Sight radius: . . . . . 500mm (19.7")
Sight settings: . . . . . 200 - 1,000m
Maximum rate of fire: . . . . . 550 - 600 rpm
Muzzle velocity: . . . . . 800m/s (2,625 fps)
Muzzle energy: . . . . . 303kg/m (2,192 ft/lbs)

Spanish Army Production Begins - with German Inspectors

Ludwig Vorgrimler records the commencement of production for the Spanish Army, which followed the expansion of the CETME facilities in Madrid, as follows:

. . Meanwhile Spanish production with German stamping tools and Spanish metal cutting machinery had started . . The use of German inspectors to supervise the assembly actually slowed the assembly process, so weapons were not delivered until October, 1957 . .

The CETME Model B (Model 58)

Biting the Bullet

582. Left side view of a prototype of the CETME Model B, marked "F.A. CETME/A-312", fitted with the new flash hider, dimensioned for grenade launching, smooth black plastic grips and longer buttstock of the Model B, but still without a handguard under the folded bipod.
photo by Masami Tokoi, courtesy Virginia Eze...

583. Left side closeup of a CETME Model B, serial no 94004*, showing the improved ridged carrying handle, stamped metal handguard and smooth black plastic grips.

Note the first appearance of the vertical magazine catch, and the experimental trigger-guard shape. The change lever is still located on the right side.
MoD Pattern Room collection

While the Spanish continued to manufacture and issue the CETME-NATO cartridge (CSP003, fig 163), modifications to the next version of the CETME rifle, the Model B, also known as the "Model 58", were made to ensure that if necessary it was capable of handling the full-power 7.62x51mm NATO cartridge, known as the *cartucho de guerra NATO.*

The mass of the bolt was increased, and the angles on the locking piece (*Steuerstück*) were altered. In addition the rifling twist was modified, to better adapt to the characteristics of the heavier bullet of the NATO cartridge.

Werner Heynen Comments on the CETME-NATO Cartridge

Dipl-Ing Heynen's account contains the following comments regarding the value of the CETME-NATO cartridge which, largely for political reasons, the Germans were constrained from adopting:

> *. . It was always the wish of the Chiefs of the AEM, General Juan Vigón and his successors, that the CETME assault rifle should be chosen as the standard rifle of the new* Bundeswehr. *For this reason our essential efforts aimed towards an agreement with Germany, after which the results of the demonstrations and tests by the German troops themselves and other testing, succeeded in having the CETME rifle accepted as the ideal. That this could be done even despite the use of the NATO cartridge is very special testimony to the weapon, because the muzzle energy of the NATO round is much too high for an assault rifle. It is understandable that, in 1956, the German officials could not avoid agreeing to the use of the NATO cartridge, although today it is generally agreed that this round is not suitable for an assault rifle, and consequently there are endeavours in every country to develop a short cartridge with corresponding performance, and also to develop a light assault rifle. We succeeded in Spain in retaining the NATO-CETME "light" ammunition, and recommended same to the Germans. This would have kept the superior assault rifle characteristics of the Model 58 in both countries, and would still have allowed the occasional use of the standard full-power NATO ammunition!*

Differences Between the Model A and Model B

The Model B incorporated a number of distinctive modifications, as follows:

1. The flash suppressor was redesigned to incorporate an integral grenade launcher.
2. Ridges were added to the carrying handle for a more positive grip.
3. A separate handguard made of louvred stamped metal was added, independent of the modified and strengthened bipod.
4. The composition of the buttplate was changed from metal to rubber.
5. The grip plates were made of smooth plastic instead of checquered wood.
6. While the fire selector is still located on the right side, the Model B fires both fully-and semi-automatically from the closed bolt position.

   This change was made after experiments had indicated that the danger of cook-offs due to overheating of the barrel was minimal, and answered objections about the disruption of aim brought about in earlier models by the bolt lurching forward from the open position to fire automatically.

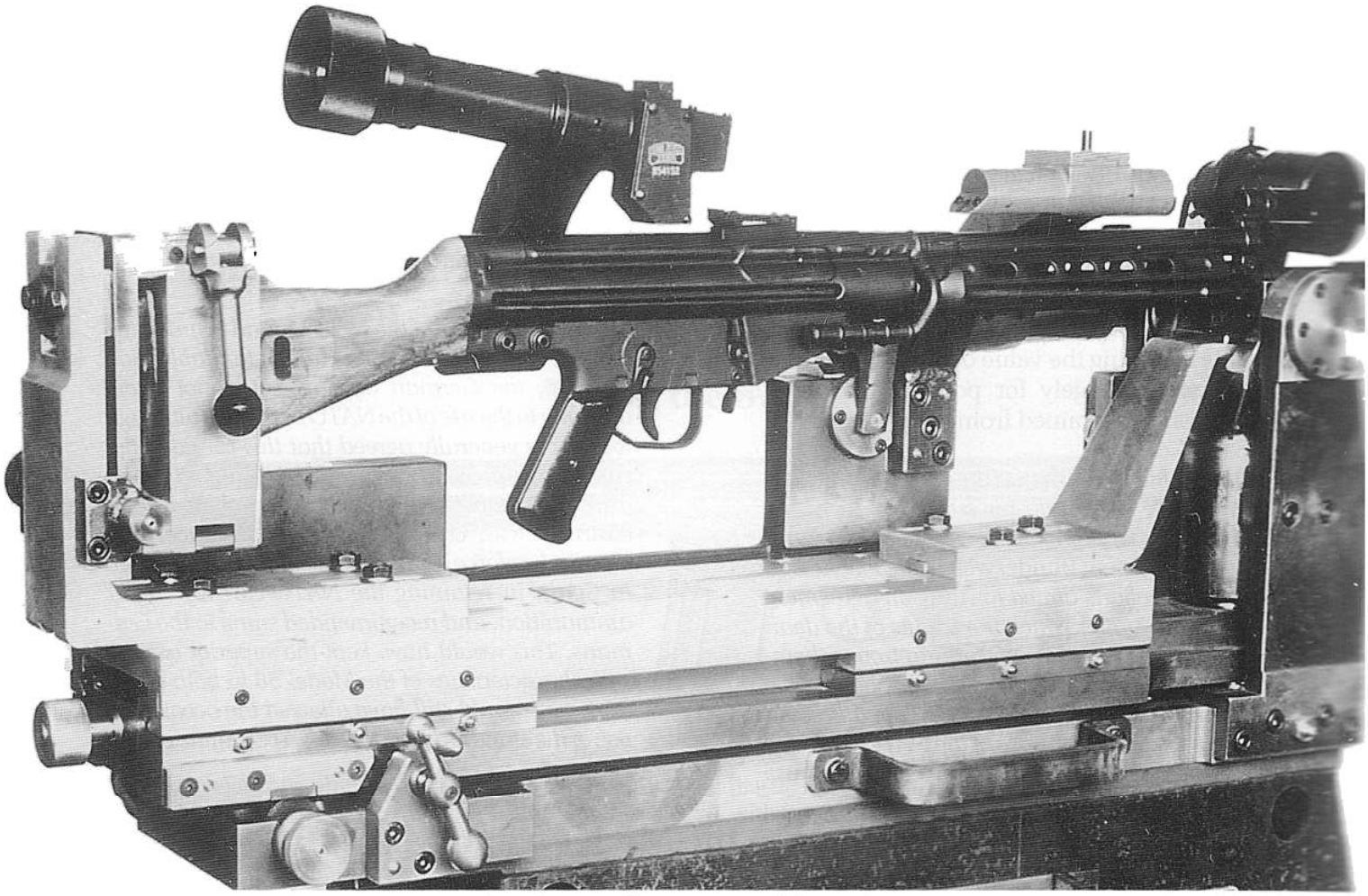
Describing the Model B, and the CETME-NATO Cartridge

The following technical data concerning the CETME Model B is taken from the official *Ministerio del Ejercito* manual no R-35, titled *Fusil de Asalto CETME Calibre 7,62mm (Mod 58)*, published in Madrid in 1960 by the *Direccion General de Industria y Material*:

Calibre 7.62mm

Ballistic Data

V_o, CETME-NATO cartridge: . 760m/s (2,493 fps)
V_o, NATO cartridge: . . . . . 770m/s (2,526 fps)
muzzle energy, CETME-NATO cartridge: 214kg/m
muzzle energy, NATO cartridge: 281kg/m
max ordinate at 500m, CETME-NATO ctg: 0.95m
max ordinate at 500m, NATO ctg: 0.86m



584. Right side view of a CETME Model B, with distinctive smooth black plastic grips, shown clamped in a German-made *Schiessmaschine* (shooting machine), used for test-firing new rifles at the factory and setting their sights.
courtesy the late Karl Schäfer

Numerical Data - CETME-NATO Cartridge

Weight of cartridge: . . . . . 19g (293 gr)
Length of cartridge: 71mm
Length of case: 50.95mm
Weight of bullet: . . . . . 7.3g (112.6 gr)
Weight of powder charge: . . . . . 1.8g (27.8 gr)
(variable depending on powder employed)

Numerical Data - NATO Cartridge

Weight of cartridge: . . . . . 23g (354.9 gr)
Length of cartridge: 71.12mm
Length of case: 51.1mm
Weight of bullet: . . . . . 9.3g (143.5 gr)
Weight of powder charge: . . . . . 2.7g (41.67 gr)
(Belgian spheroidal powder)

Numerical Data - CETME Model B Rifle

Overall length of CETME rifle: . 1,015mm (39.96")
Barrel length: . . . . . 450mm (17.7")
Length of rifled portion: . . . . . 397mm (15.6")
Sight radius: . . . . . 455mm (17.9")
Weight of rifle: . . . . . 4,6kg (10.14 lbs)
Number of rifling grooves: 4
Theoretical maximum rate of fire: . 550 - 600 rpm
Practical rate of automatic fire: . . . . . 260 rpm
Practical rate of semi-automatic fire: . . . 80 rpm
Weight of empty magazine: . . . . 280g (.62 lb)
Weight of magazine, loaded with 20
CETME-NATO cartridges: . . . . 660g (1.46 lbs)

The CETME Model A and B in Combat

First Blood at Sidi Ifni, in the Forgotten War (*La Guerra Olvidada*)

The following brief outline of the Ifni War (October 23, 1957 - June 30, 1958) has mainly been extrapolated from the online account featured on the website of Wikipedia at <http://en.wikipedia.org>.

The city of Sidi Ifni, on the western coast of what is now Morocco, had been incorporated into the Spanish colonial empire in 1860, and the following decades of Franco-Spanish collaboration resulted in the extension of Spanish influence south of the city. In 1946 the region's various coastal and inland colonies were consolidated as Spanish West Africa.

Following Morocco's hard-won independence from France, King Mohammed V began eyeing these Spanish possessions, which he regarded, historically and geographically, as part of Moroccan territory.

The 1957 invasion of the Spanish Sahara, known in Spain as "The Forgotten War" (*la Guerra Olvidada*), was a series of armed incursions into what was then Spanish West Africa, conducted by Moroccan insurgents and indigenous Sahrawi rebels.

Violence against foreign rule erupted on April 10, 1957, followed by civil strife and the widespread murder of those loyal to Spain. Generalissimo Franco responded by despatching two battalions of the élite Spanish Legion to El Aaiún in June.

Spanish military mobilisation resulted in the Moroccan Army converging near Ifni. On October 23, 1957, two villages on the outskirts of Sidi Ifni were occupied by 1,500 Moroccan soldiers (*Moukhahidine*), who began the encirclement of Ifni. Two more battalions of the Spanish Legion reached the Spanish Sahara before hostilities actually began.

The conflict began in earnest in November, 1957, when the CETME Model A was just entering service with Spanish forces. Ludwig Vorgrimler's account mentions this, as follows:

> *. . for the first time 800 CETME rifles were delivered to Spanish forces in the Sahara, where they proved extremely effective during the uprising in Sidi Ifni . . and according to Spanish reports made possible a victory against the black enemies armed with sub-machine guns.*

Several bloody battles ensued. On November 25, the enemy positions were bombed by a fleet of five old Heinkels, vestiges of Franco's wartime alliance with Hitler, while five Junkers transports dropped a force of 75 paratroopers, armed with CETME rifles, into the outpost.

Fighting continued until in February, 1958, Franco-Spanish troops deploying a joint fleet of 150 aircraft launched a major offensive which successfully dismantled the Saharan Liberation Army.

The abortive siege of Sidi Ifni, which was uneventful and relatively bloodless because both Spain and Morocco had concentrated their resources on Saharan theatres, was lifted on June 30, 1958, by which time Spanish troops were armed with the CETME Model B (Model 58).

Meanwhile on April 2, 1958 the governments of Spain and Morocco had signed the treaty of Angra de Cintra, which granted some territory, but not Sidi Ifni, to Morocco.

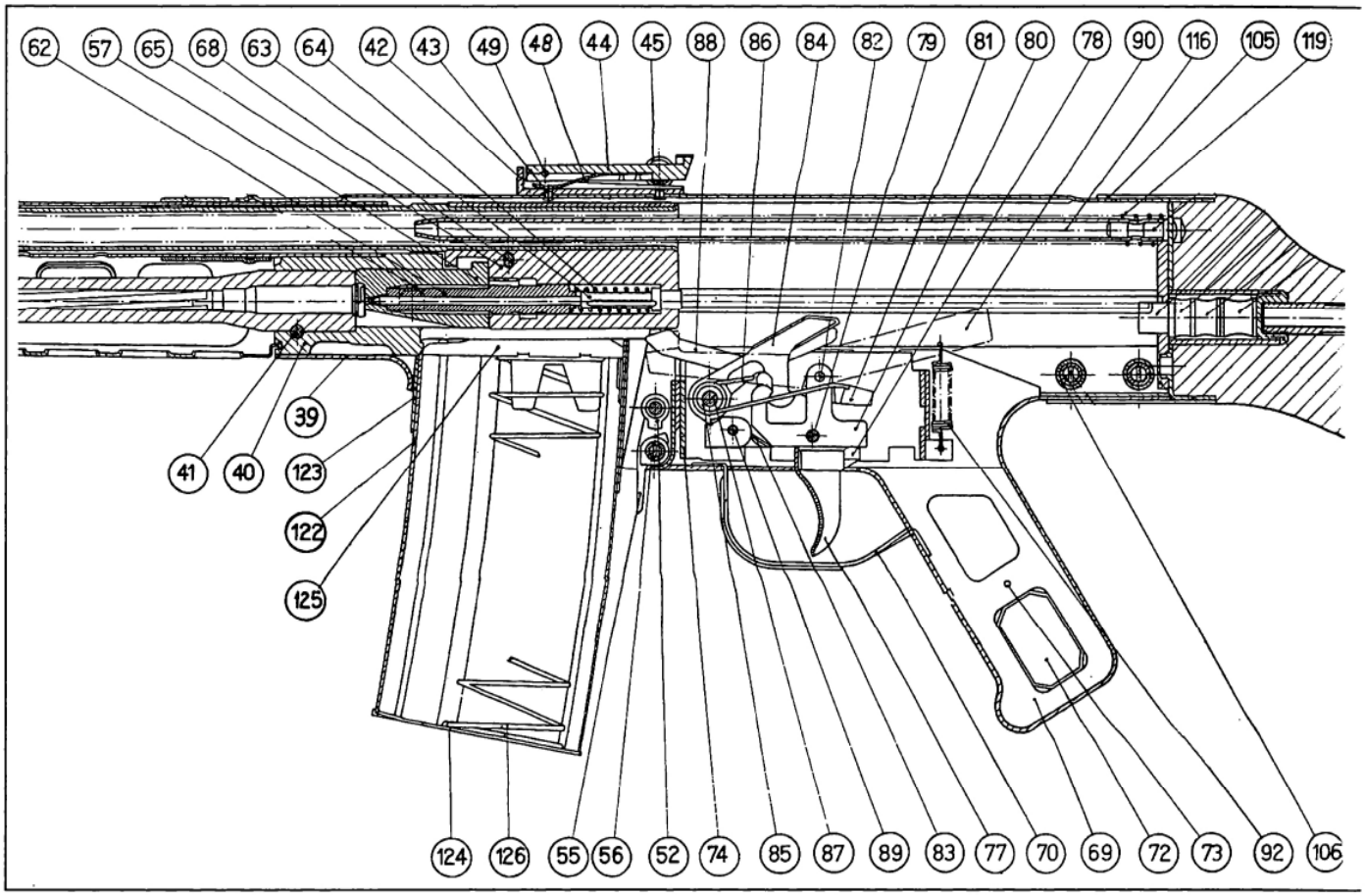
Spain retained possession of Ifni until 1969, when under international pressure it returned the territory to Morocco. Spain kept control of the Western Sahara until 1975, then withdrew its forces from Africa completely.

Spanish/German Compatability Lost

Production of the interim CETME Model B had begun in 1958, and the new rifle was declared standard issue for the Spanish Army, Navy and Air Force in that year.

As Werner Heynen records, the initial compatability of the Spanish CETME with its German offshoot, the yet-to-be adopted G3, was unfortunately largely lost during the period of adoption and manufacture of the CETME Model B (Model 58):

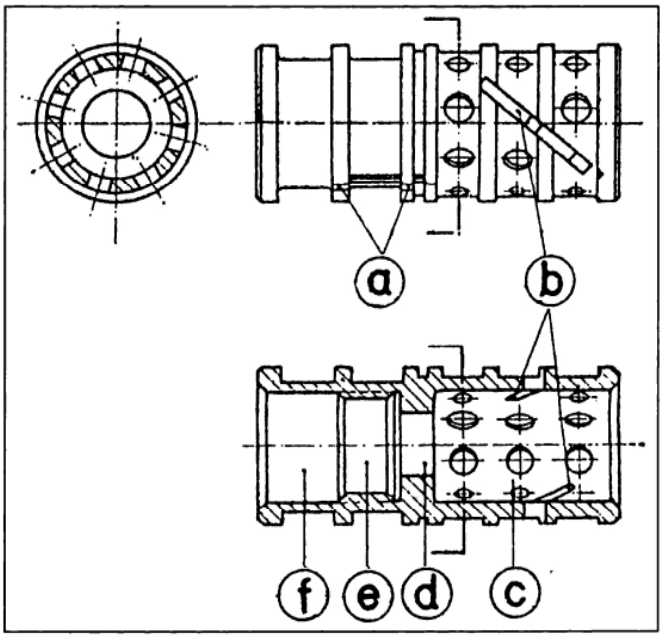
> *. . Since a real Spanish production capability was now at hand, it had to be decided which of the German modifications should be adopted by Spain, and which should not. In addition, the Spanish trials themselves had produced various recommendations for modifications, and while in many cases these coincided with the "German list", some were different again. The equipment used to produce the original version of the rifle had*



585. Left side sectioned closeup of the CETME Model B, with components numbered.

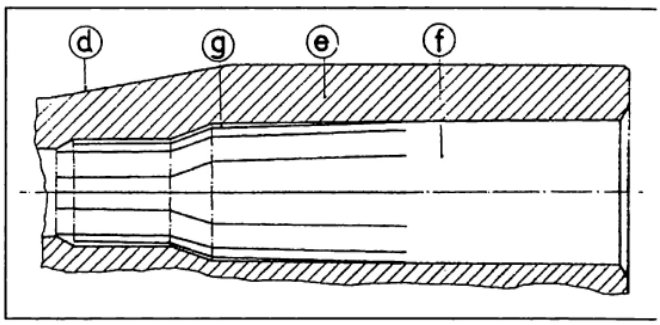
Production of the Model B began in Spain in 1958, at which time the compatability between the German DM3 and the Spanish CETME was largely lost.

courtesy Les Field



586. Factory drawings of the CETME Model B flash hider, dimensioned for launching rifle grenades.

courtesy Les Field



587. A partial cross section of the Model B barrel, showing the fluted chamber. courtesy Les Field

been purchased at considerable expense in both Spanish as well as foreign currency. During intensive discussions between H&K and CETME in Oberndorf in February, 1958, it was determined which changes from the "German list" should be taken for Spain, and which abandoned. It was understood, however, that additional changes could be made later on, but that presently only the ones agreed to were to be used in the production of the Model 58.

On March 14, 1958, it was determined which of the German changes should be included into the blueprints of the Model 58. As a result new toleranancing of the moving parts was required, after which this technical documentation was also handed over to the German Defence Ministry.

It was planned that the factories in La Coruña and Oviedo should be used for production of weapons for the Army. From April to June 1958, workers from these factories came to CETME for instructional support. Until production could be established in these military factories, CETME was ordered to produce 20,000 assault rifles for the Army, as well as supplying every possible assistance to these factories during their tooling up.

Various improvements have also been made in Spain over the years, but without co-ordination with Germany. There are fierce attempts today [1962] to have the German G3 as a basic model for NATO armament. Interchangeability between the Spanish Model 58 and the G3 no longer exists, not even between entire major assemblies. This is a regrettable situation from the viewpoint of European defence.

In retrospect, it must be said that it would have been wiser had the German and Spanish versions of the rifle been made identical to one another. While the factory for the production of the weapon was ready now, with most of the agreed-upon changes ready for inclusion at the outset of production, in making the necessary changes to the tooling Spain faced the obsolescence of its earlier means of production to a value of over DM100,000.

Unfortunately, further contact with H&K was lost, through various circumstances. In Germany, the collection of experience gained by the troops themselves led eventually to a weapon named the G3, which contained numerous parts and tolerances which no longer coincided with those of the Model 58.

The Spanish Ministry of the Army Secures Production Rights to the CETME

In Chapter Fifteen we have already discussed the lengthy negotiations which took place before the West German government was able to secure the production rights to the G3. Werner Heynen continues with an account of how a similar transference was effected in Spain, as follows:

. . On July 23, 1958 a contract between the Spanish Ministry of the Army and CETME gave the Ministry the rights to copy and reproduce the design of the CETME rifle. Conditions of acceptance were laid down in the customary Spanish way, with an acceptance officer of the Army to be stationed at the CETME shop. Stockages of repair parts and accessories were determined.

Meanwhile, production of the Model 58 in the factories at La Coruña and Oviedo was in full swing . .

A Critique of the Full-Power NATO Cartridge

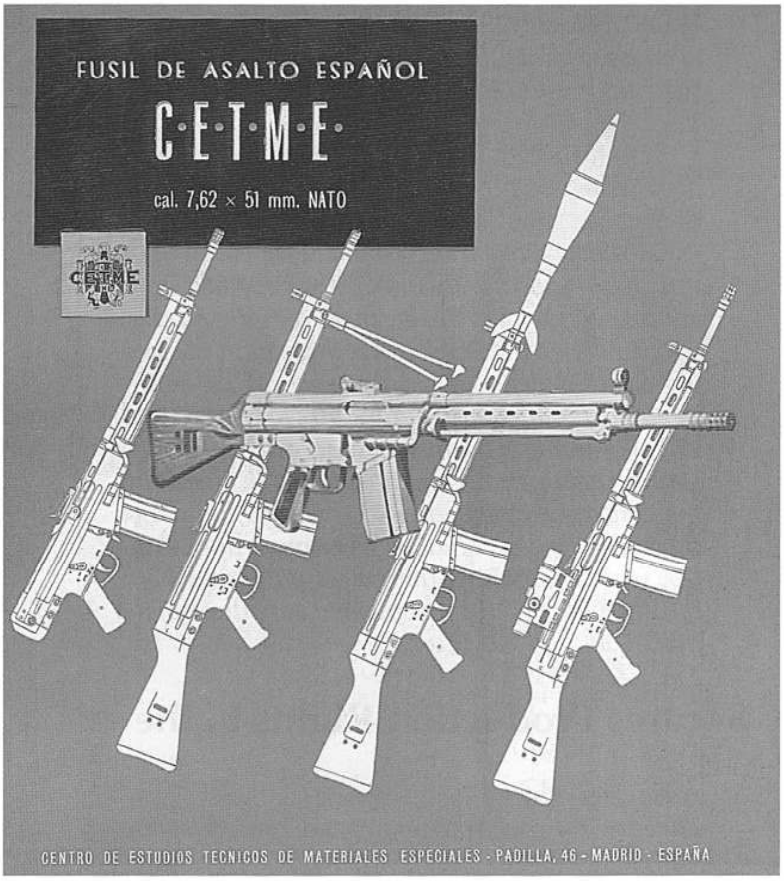
Dipl-Ing Heynen adds the following reasoned critique regarding the downside of the full-power NATO cartridge as applied in an assault rifle context, and the effects of its forced adoption in Germany and other countries:

. . in time, the ammunition that was developed was officially adopted in Spain as the NATO-CETME 'light' ammunition.

In Germany, however, the NATO cartridge was demanded, even though it was repeatedly pointed out that the characteristics of this ammunition were unsuitable for the intended tactical use of an assault rifle. However, at that particular time, for understandable reasons, no official consideration could be given to this fact. Only when the Russians developed their own 'kurz' cartridge was the decision taken in various NATO countries to develop alongside the NATO anmmunition a suitable short ammunition for assault rifles, and to retain for use against larger obstacles a machine gun in the larger calibre.

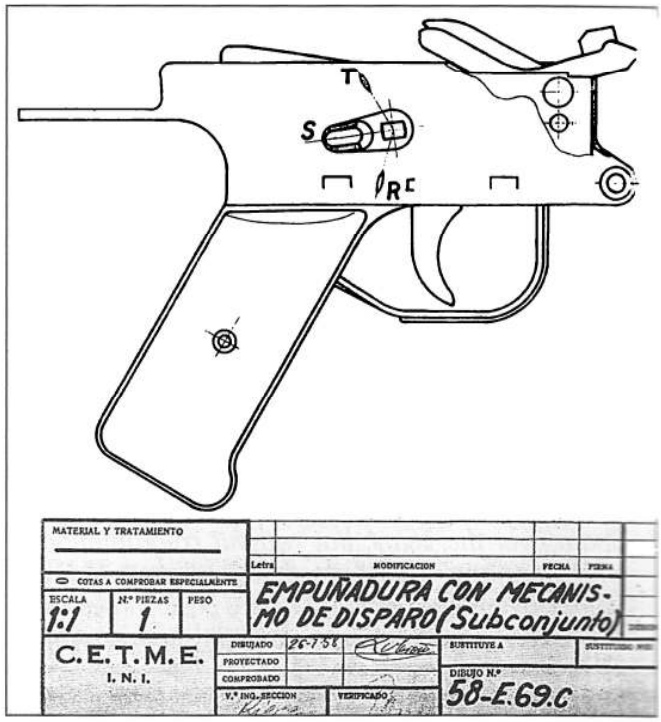
Through such changes in the ammunition many hundred thousand weapons became more or less obsolete, and in addition the only truly effective guidelines covering standardisation of the NATO cartridge were overturned, resulting in a wild, manyfold development of new 'kurz' cartridges in many countries: thus the intention to maintain interchangeability of small arms ammunition throughout NATO was abandoned, to the detriment of all.

Spain, however, up to this time [1962] has retained the NATO-CETME 'light' ammunition, which has proven its effectiveness without a doubt, and which can at any time be replaced with the



588. The (blue) cover of an illustrated handbook on the CETME Model B, showing four applications of the rifle behind the superimposed standard rifle with bipod folded.

From left: folding stock model for armoured vehicle use; rifle in LSW mode with bipod lowered; rifle ready to launch a grenade; sniper's rifle with telescopic sight attached. courtesy the late Dr Edward C Ezell



589. CETME factory drawing dated July 26, 1958 of the Model B pistol grip and trigger assembly, with selector located on the right side.

Note the selector positions, from top: T (*Tiro a tiro*, semi-automatic); S (*Seguro*, Safe); R (*Ráfaga*, automatic courtesy Walter Schmid

original full-power NATO cartridge. It would have been desirable to have co-ordinated the development of an assault rifle cartridge which, while not a 'short' cartridge, could have been introduced within NATO at the appropriate time . .

As regards weapon development, these changing considerations were a very negative influence which caused considerable delays . .

The CETME with French(!) Marine Commandos

The following is a translated compilation of some interesting notes kindly prepared for the author by the ex-H&K weapons technician (and ex-Marine Commando) Wolfgang Riess, concerning the little-known use of some captured Model B CETME rifles by French Marine Commandos during the war in Algeria in the early 1960s and for some years thereafter:

How It All Began

. . What little documentation there is concerning the use of the CETME by Marine Commandos of the French Navy comes from the military archives at Lorient and Toulon.

*First, to clarify a point, the Marine Commandos are part of the French Navy and not the French Army (*Armée de Terre*), and as such they are distinct from the Marine Infantry, which is part of the Army.*

The story, as it was later pieced together, concerns a quantity of 200 Model B CETME rifles which had been consigned at a German port to a Danish freighter, the Margot Hansen. *The vessel was stopped and inspected in French territorial waters off the coast of Algeria in March, 1961, after*

*having been spotted by a French maritime patrol aircraft. It was determined that the vessel was attempting to smuggle contraband arms and a quantity of 7.62mm NATO ammunition to the insurgent ANL (*Armée de Liberation Nationale*) and FLN (*Front de Liberation Nationale*) during the Algerian war.*

The weapons and ammunition were seized and off-loaded at the port of Mers El Kébir, where they were deposited in a depot in the local Marine arsenal.

Most of the arms stored in this arsenal, which had been seized from time to time by the Navy or customs officials, were K98k bolt-action rifles or StG44 assault rifles, both leftovers from WWII and as such nothing particularly innovative or strikingly modern.

Thus the new arrivals soon attracted the attention of the Marine Commandos, who recognised the CETME as a most modern weapon indeed, one which had no equal among the arms then being issued to them. However, according to an eyewitness the rifles were all missing their firing pins, and were thus unuseable.

Two possible reasons for this are as follows:

1. *These arms were perhaps being furnished by unscrupulous traffickers, who in order to ensure that the recipients would abide by the terms of their agreement, would have held back the firing pins and then demanded an additional high price for them after the rifles had been delivered. This sort of thing had happened before.*
2. *The other possibility is more complicated, but similar operations had been executed in the past. In order to drain the finances of rebel organisations, agents of the SDECE (the French Secret Service), posing as arms traffickers, sold arms which were non-functional at very high prices in "sting" operations to the insurgents. It is always difficult to ascertain the truth about this type of clandestine operation, for most of the records that do exist are classified.*

Issuing the Seized CETMEs to the Marine Commandos

590. Right side view of one of the 200 Model B CETME rifles seized off the coast of Algeria in March, 1961. This example and at least one other were subsequently issued to Wolfgang Riess' Marine Commando unit.

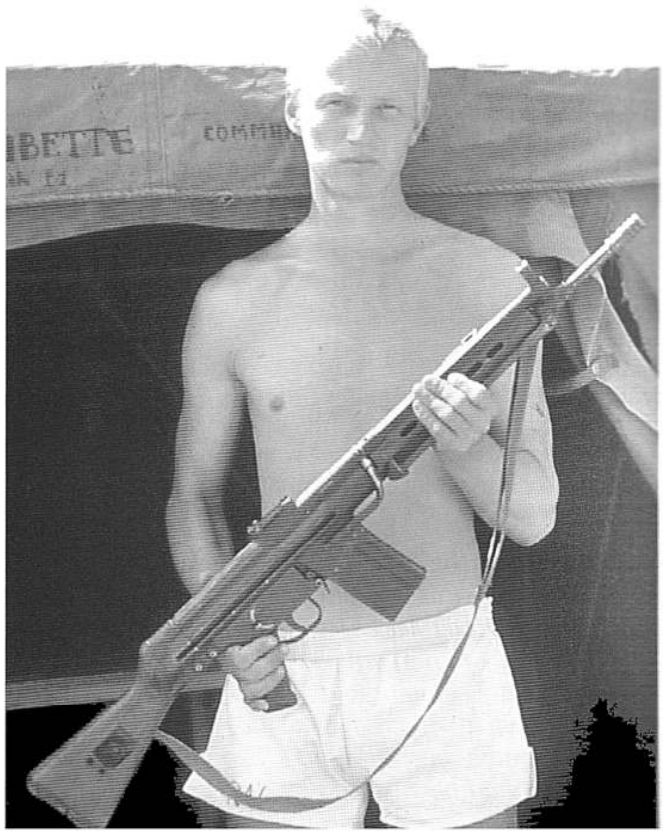
The Commandos made good use of the CETME, which they saw as "a most modern weapon indeed, one which had no equal among the arms then being issued to them."
courtesy Wolfgang Riess

In any case, the Marine Commandos were very interested in this material, and requested that these orphaned rifles be issued to them, along with the stock of 7.62mm ammunition which had been seized at the same time as the rifles, so that they could be put in service against those for whom they had originally been destined. The fact that these weapons had been seized by the Navy and were being held in a Naval arsenal facilitated their appropriation by the Commandos, and this was quickly accomplished, the CETMEs being issued to group leaders and their assistants. The potential of firing both single shots and bursts of powerful ammunition from a lightweight weapon possessing a bipod and a 20-round magazine soon saw the CETMEs replacing the issue Modèle *24/29*

591. A group of Marine Commandos in Wolfgang Riess' unit try out their two CETME Model Bs in Algeria.
courtesy Wolfgang Riess

Châtellerault light machine guns with everyone fortunate enough to acquire one.

Working with no plans or drawings of what the originals had looked like, the machinists at the Naval arsenal did their best to manufacture a new set of firing pins, but the replacements were not of the finest quality and were found to fracture very frequently, to the point where it was considered advisable to go into action with a handful of spare firing pins in one's pocket, although the replacement of this component in the field during combat could hardly have been a simple task. The French Naval arsenal obligingly manufactured a large number of spare CETME firing pins, even experimenting with different steels, but the breakages continued.

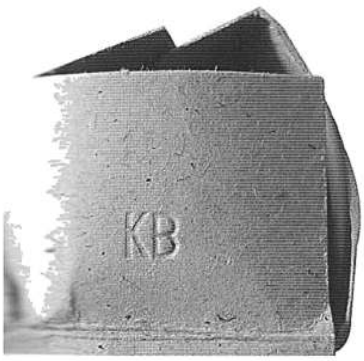


592 (right). Wolfgang Riess himself in front of his tent on a hot day in Algeria, displaying one of his unit's Model B CETMEs.

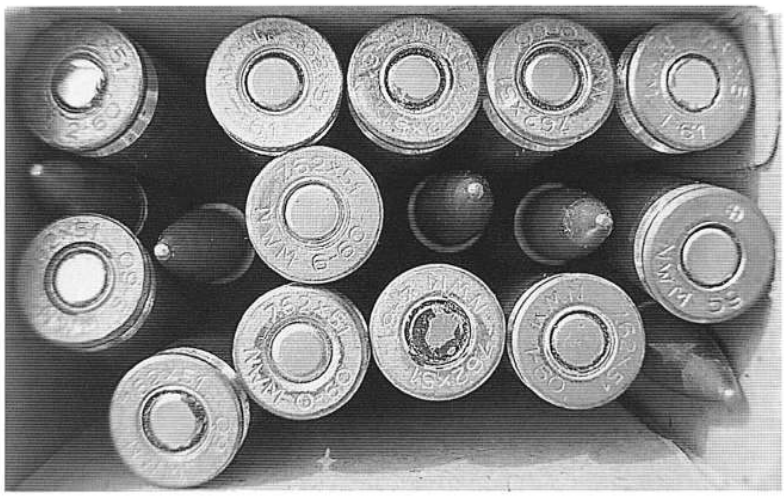
Beside his normal combat duties he served as the unit's armourer. courtesy Wolfgang Riess

The Ammunition: Cobbled from Rejected NWM Components

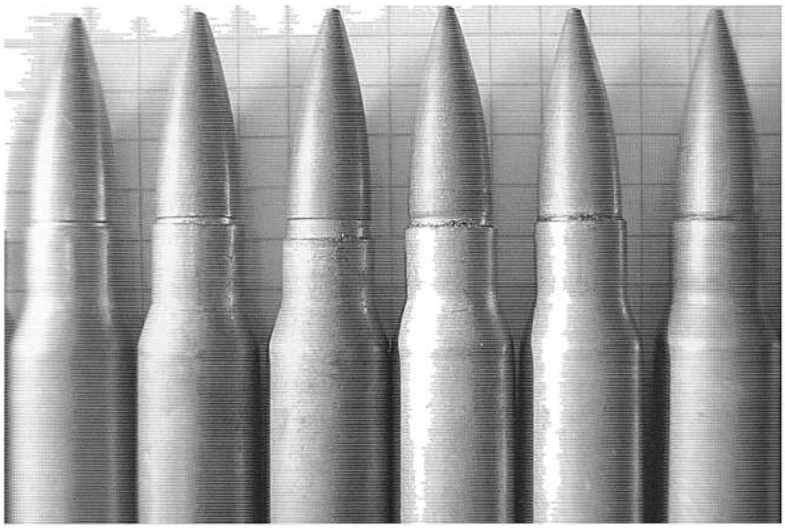
593. One of the boxes of 20 rounds in which the 7.62mm NATO ammunition was found when it was seized.
Note the not-very-informative generic label.
courtesy Wolfgang Riess



595 (left). The only identification on the pasteboard cartridge boxes was this "KB" boxmaker's impression.
courtesy Wolfgang Riess



594. An end-on view of one of the boxes, showing the haphazard method of packing the cartridges.
Headstamps are mixed, ranging from a NATO cross-in-circle dated 59 (right centre) through "7.62x51" markings variously dated through 1960 and 1961. All are marked "NWM". courtesy Wolfgang Riess



596. A closeup of a typical selection of the NWM cartridges seized with the 200 CETME rifles.
Note the haphazardly seated bullets; it was soon apparent that these cartridges had been hurriedly assembled from rejected components. courtesy Wolfgang Riess

Another interesting side to the story concerns the ammunition which was seized along with the rifles. Differences in overall length of over 1mm were noted in various sample cartridges, because the bullets in some cartridge cases were not fully seated, and some bullets had no cannelures. Some cartridges that appeared to be useable would not fire, and it was discovered that they had no flash holes for the Boxer primers. It dawned that these cartridges had been assembled from rejected components, which had supposedly been destined for destruction. In addition, the cartridges were loaded with ball powder to the full NATO specification, which was somewhat overpowered for the CETME action of that period.

The cartridges were packaged in 20-round thin cardboard boxes, the box flaps being embossed with the initials of a German boxmaker. The pasted-on paper box labels were quite generic, and a considerable variety of headstamp dates were

noted. A few, dated "59", were marked with the NATO cross-in-circle symbol, but most bore the calibre designation "7.62x51", and 1960 dates O-60, 60, 1-60, 2-60, 4-60, 5-60, 6-60, 7-60 and 8-60, and 1961 dates 1-61, 2-61, 3-61, 4-61 and 5-61. All bore the manufacturer's initials "NWM". Cartridges with different headstamp dates were mixed up in the boxes.

The CETMEs in Service - with French Ammunition

597. Right side closeup of one of the two Model B CETMEs issued to Wolfgang Riess' Commmando unit. Note the black sealing at the mouth of the standing NATO cartridge typical of French manufacture. courtesy Wolfgang Riess

599. A group of Commandos pause for a short break during an operation against the Algerian FLN (Front de Liberation Nationale). They are posing with their MAT49 submachine guns and their two CETMEs, one leaning against another with its bipod lowered.

No magazine pouches had accompanied the CETMEs when they had been seized, so pouches for Model 24/29 Châtellerault LMGs were used instead.

The two CETMEs appear to have been reserved for the group leader (reclining at centre, with binoculars) and his second-in-command.

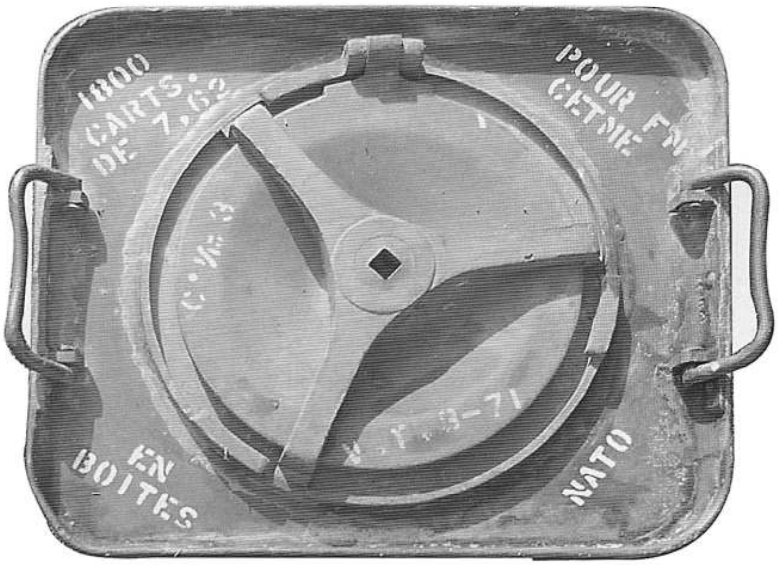
The man at far right has his MAT49 in his lap and a five-magazine pouch around his neck, characteristic of the French Marine Commandos of that period. These pouches were also used to transport anti-personnel rifle grenades.

courtesy Wolfgang Riess

The Commandos quickly switched to cartridges of French manufacture, and with these the 200 CETME rifles remained in service for quite some time, being used in operations as late as 1978. Following this they were retained for instructional purposes and, in exceptional circumstances, for use in missions abroad. They were finally declassified in the early 1990s and all but a few which were reserved for museums were destroyed in about 1998.

598 (previous page). A Commando in training, firing his CETME Model B prone off the bipod from an emplacement previously occupied by an AA 52 LMG (note the numerous fired 7.5mm French cartridge cases on the ground). Two spare magazines lie beside his musette bag at far left. courtesy Wolfgang Riess

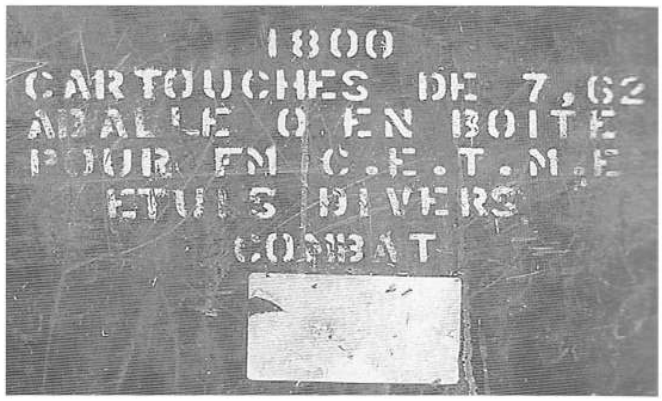
More on the Seized NWM Ammunition



600. Top view of one of the waterproof copper canisters in which, after a rigourous inspection, the seized ammunition was repacked for long-term storage.

Note the stencilled marking at top right "*Pour FM [Fusil Mitrailleur] CETME*", indicating that at the time the French considered the CETME to be a light machine gun.

The marking "V . T . 3-71" on the lid indicates that this ammunition was verified by the arsenal at Toulon in March, 1971. courtesy Wolfgang Riess



601. Side closeup of the same canister, showing stencilled markings.

These translate as "1,800/7.62 cartridges/ordinary bullet (FMJ)/for CETME light machine gun/diverse cartridge case [lots]/for combat use." courtesy Wolfgang Riess

In 1988, due to a shortage of 7.62mm NATO ammunition for target shooting, the author of this piece requested and was issued the remaining stock of the seized ammunition, which had meanwhile been inspected and repacked for long-term storage in waterproof copper cannisters of 1,800 rounds each by the Naval arsenal at Toulon in March, 1971.

Despite its dubious pedigree, this ammunition was capable of respectable accuracy, and it was reserved for match use by sharpshooters firing precision FRF2 rifles at ranges of 50 to 100 metres. Match ammunition of more recent manufacture was used for shooting at longer distances.

In this manner the remaining stock was exhausted by the end of 1992, and none of it remains today. Certainly no more of it was used in combat operations.

Some Final Speculation

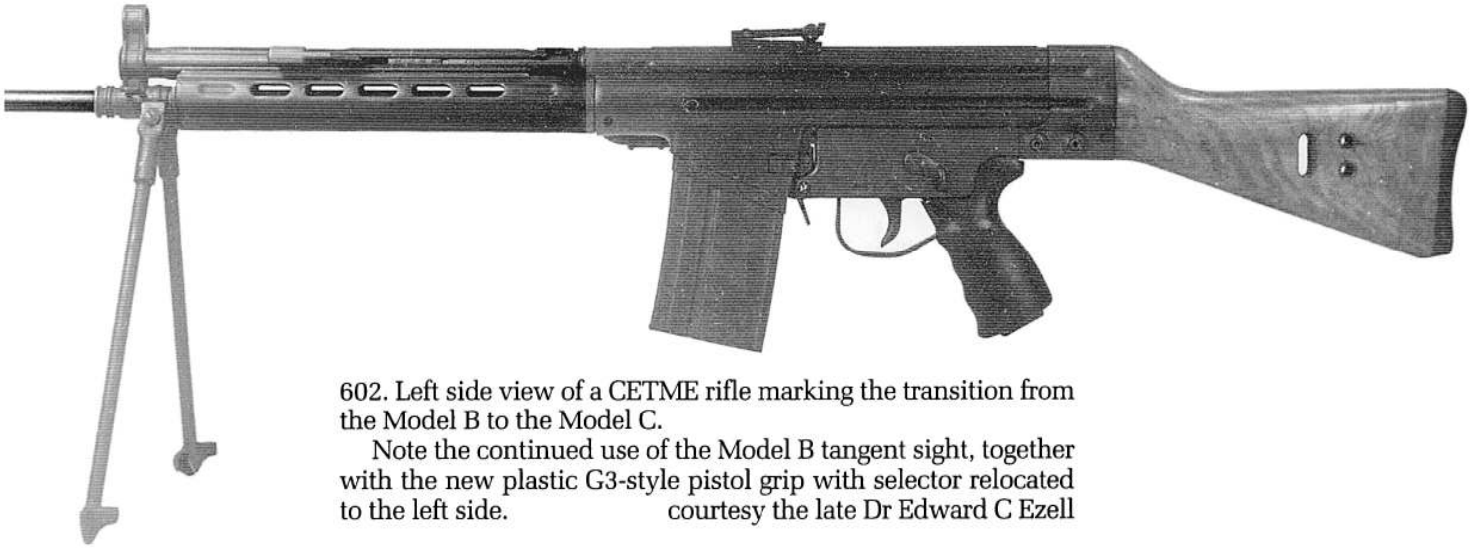
In reviewing this rather bizarre tale, it is interesting to speculate on how these rifles came to leave Spain without full and proper documentation. In those days the CETME was a first-line weapon in Spain, and it could not have been easy to acquire this type of weapon without official permission.

We know of course that the CETME had formed the basis for the G3, which had been adopted as the standard arm of the Bundeswehr *in 1959. We also know that during this period the CETME was represented by the Dutch arms firm NWM. Perhaps these 200 CETMEs were diverted by traffickers who had gained knowledge of such a shipment being legitimately under way from Spain to Germany, or to Holland. It is well known that Germany was a centre of this sort of traffic in illicit arms, and that the Algerian rebels had numerous sympathisers within Germany.*

One of the most notorious of these Algerian sympathisers was a German arms trafficker named Otto Schlueter, nicknamed "Otto the Strange", who was conveniently located in the German port city of Hamburg. His escapades were the stuff of legend in Germany during the 1960s, and he could well have been behind this aborted attempt to smuggle CETMEs and ammunition to Algeria. The right-wing French-Algerian arm of the *Service de Documentation Extérieure et de Contre-Espionnage* (SDECE - the French Secret Service) called *La Main Rouge* (The Red Hand) made numerous attempts on his life during which Otto's car was bombed twice and his mother was killed, but he always managed to escape.

The file on Otto Schlueter was quietly closed many years ago, with all the SDECE activities covered up so that no one was ever accused of any wrongdoing.

The 7.62mm NATO Calibre CETME Model C (Model 1964)



602. Left side view of a CETME rifle marking the transition from the Model B to the Model C.

Note the continued use of the Model B tangent sight, together with the new plastic G3-style pistol grip with selector relocated to the left side. courtesy the late Dr Edward C Ezell

The Interim "Model 1958-64-C"

603. Left side closeup of the interim "Model 1958-64-C", marked "F.A.-CETME-C Cal. 7,62mm", serial no E.T. *71442*, manufactured by Empresa Nacional Santa Bárbara, with selector still on the right side. Note the first appearance of the four-way flip-over rear sight, which has been relocated to the rear of the receiver.

Inset, left: the Santa Bárbara logo, which is also stamped on the receiver. MoD Pattern Room collection, photo by Reiner Herrmann

The Model B CETME was in production for several years, during which time a number of further modifications were suggested as a result of further engineering studies, as well as to answer requests from Spanish troops. These were gradually introduced in the interim "Model 1958-64-C" which paved the way for the long-serving Model C, adopted in 1964.

Production Shifts to Santa Bárbara

604. The façade of the Oviedo arms factory in a recent photograph. All the more recent CETME manufacture has taken place here. Note the oblong white sign, under the clock at lower centre, which reads "General Dynamics/Santa Bárbara Sistemas". courtesy Steve Kehaya

Ironically, even though the original CETME rifle had formed the basis for the German G3, the two designs had thereafter been developed independently of one another to the point where interchangeability, even between entire major assemblies, had been lost.

Dipl-Ing Werner Heynen's account next describes the decision which saw the production base shifted away from CETME, as follows:

> *. . Today all [military production] has been transferred to the factory EN Santa Bárbara de Industrias Militares SA, while for the purpose of export only the production of small numbers of rifles continues in the shops of CETME itself.*
>
> *There was also an intention to produce parts for a percentage of all orders from the* Bundeswehr *at CETME. This continuation of production was also very useful from the viewpoint of further development, and there are slim hopes that through this there still exists the possibility of standardisation between the German and Spanish versions . .*

Interestingly, the address given on brochures for the Design Department of Empresa Nacional Santa Bárbara is Julián Camarillo 32 in Madrid, the same as that shown on earlier brochures of the Compania de Estudios Tecnicos de Materiales Especiales (CETME).

Adopting the Long-Serving Model C

605. Left side view of a typical example of the long-serving CETME Model C, serial no C-53223.

Note (from front) the redesigned, grenade-capable slotted flash hider, the bayonet catch, the clip-on accessory Model BR bipod with adjustable legs, the wooden handguard, the absence of a carrying handle, the four-way flip-over rear sight, and the rubber buttplate.

courtesy the late Dr Edward C Ezell

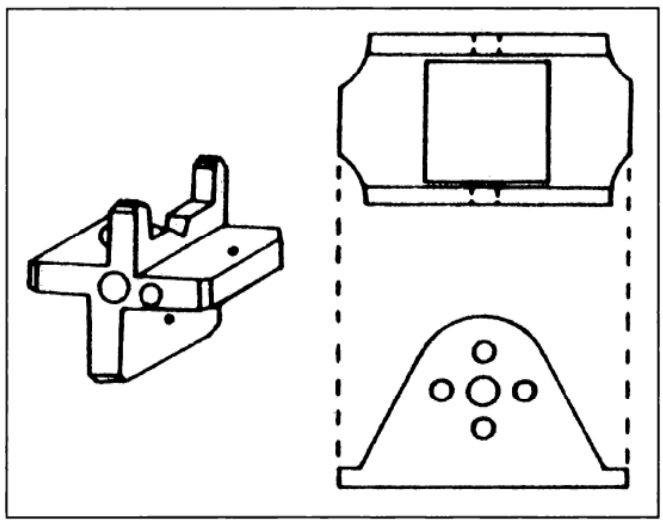
The inception of the CETME Model C coincided with the 1964 adoption by the Spanish Armed Forces of the full-power 7.62x51mm NATO cartridge.

The finalised CETME Model C was formally adopted by Spanish forces on April 28, 1964, and remained the standard shoulder weapon of all Spanish forces until at least 1976, the year of publication of the confidential document *Fusiles de Asalto CETME*, the source of much of the descriptive material contained herein.

Differences Between the Model B and Model C

The following main differences will be noted between the CETME Model B of 1958 and the Model C of 1964:

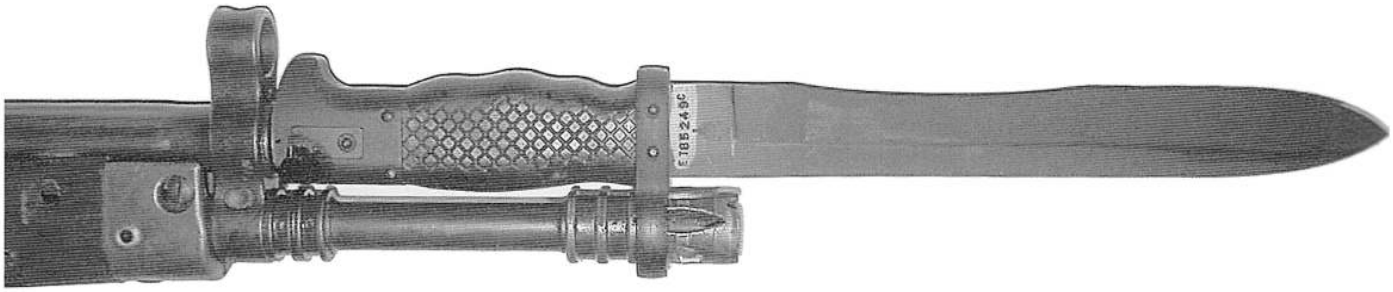
1. the old centrally-located ladder sight was replaced with a new four-position flip rear sight, relocated at the rear of the receiver. Range settings on the new sight are 100, 200, 300 and 400 metres, with the 100 metre setting being an open 'V' battle sight.
2. a redesigned one-piece plastic "orthopedic" grip sleeve, with finger grooves and thumb rest, obviously one of the "German changes", which slid up over the stamped-metal grip frame and was secured by a single machine screw on the right hand side.
3. the possibility of attachment of a bayonet-knife resembling the traditional Mauser bolo bayonet, which was also the result of a CETME design project.



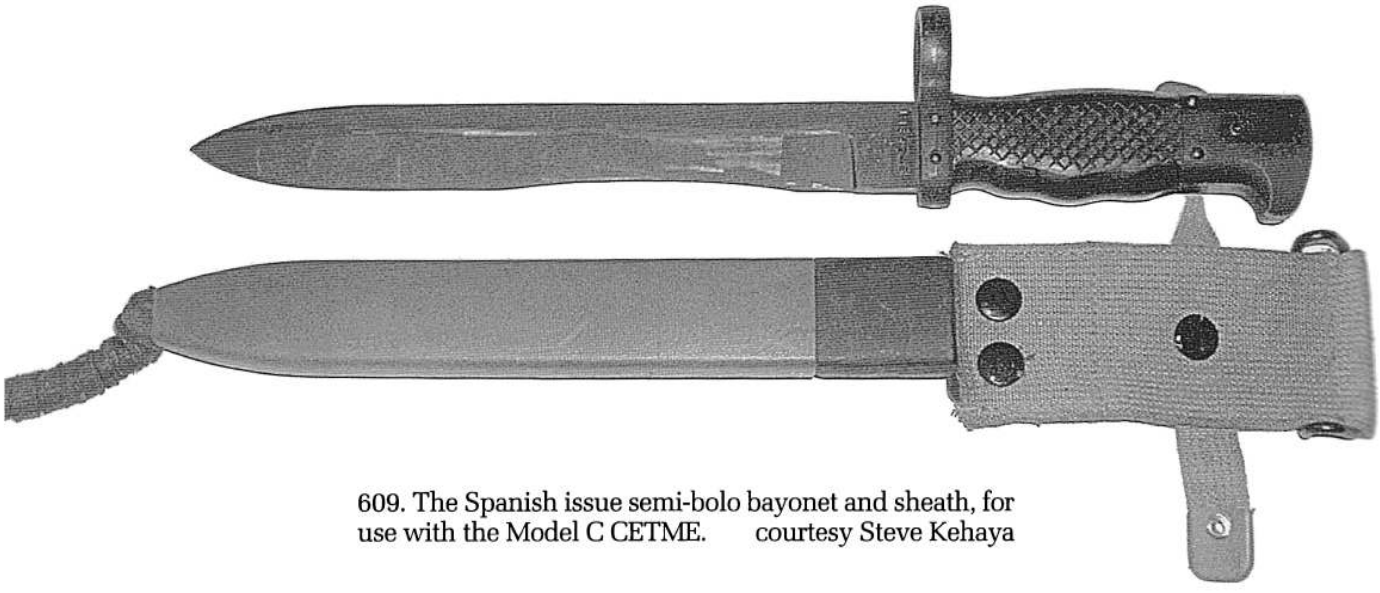
606. Drawings of the Model C four-position flip rear sight. Range settings are 100, 200, 300 and 400 metres, with the 100 metre setting being an open 'V' battle sight.

from *Historia del Armamento Espanõl, Toma II*, courtesy the late Dr Edward C Ezell

607. Left side closeup of a CETME Model C, cut away for instructional purposes. courtesy Steve Kehaya



608. Right side closeup of a CETME Model C with Spanish issue bayonet affixed. courtesy Steve Kehaya



609. The Spanish issue semi-bolo bayonet and sheath, for use with the Model C CETME. courtesy Steve Kehaya

4. a modernised flash hider with longitudinal slots, which also served as a launcher dimensioned for NATO-standard grenades.
5. elimination of the bipod and carrying handle, and replacement of the stamped metal handguard with a new design made of wood with metal-reinforced ends. The louvred metal handguard and a separate bipod could still be fitted if desired, and a Model BR bipod with telescoping legs could be attached to the bushing of the front sight block when the wooden handguard was fitted.
6. A special five-round magazine was available for training purposes and garrison duty.

Describing the Model C

610. Left side view of a CETME Model C with optional optic sight attached.
As can be seen both the scope and its mount differ from the German pattern.
courtesy the late Dr Edward C Ezell

The English-language handbook titled *Abridged Description and Operation of the CETME Model C Assault Rifle, Caliber 7,62x51mm*, issued in 1967 by the Centro de Estudios Tecnicos de Materiales Especiales - INI in Madrid, contains the following technical data concerning the CETME Model C:

Overall length:	1,015mm (40")
Weight with wooden handguard:	4.2kg (9.26 lbs)
Weight with bipod and metal handguard:	4.5kg (9.92 lbs)
Barrel length:	450mm (17.7")
Twist:	one turn in 305mm (12")
Number of grooves:	4
Sight radius:	580mm (22.8")
Weight of 20-rd magazine, empty:	275g (.6 lb)
Weight of 5-rd magazine, empty:	155g (.34 lb)
Sight settings:	100, 200, 300, 400m
Maximum rate of fire:	550 - 650 rpm
Muzzle velocity:	780m/s (2,559 fps)
Muzzle energy:	293kg/m (2,119.3 ft/lbs)

Four Types of Markings on the Model C

Over the course of production a total of four slightly different legends were used as identifiers on the F.A. (*Fusile de Asalto*; Assault Rifle) CETME Model C. These, in the order of their appearance, were as follows:

F.A. CETME 58
F.A. CETME
F.A. CETME C
CETME C

The CETME Model R Firing Port Weapon

611. Left side view of the CETME Model R firing port weapon, described in the text.

Note the heavy barrel, the robust vehicle interface, the special cocking handle, the absence of sights, and a butt cap in place of the buttstock. courtesy Terry Gander

The purpose-built CETME Model R was an offshoot of the Model C, designed expressly for firing through firing ports from within armoured vehicles. As such the Model R featured a modified cocking system located on the receiver directly behind the heavy armoured firing port adapter, no sights, and a truncated rear end cap with no buttstock.

An undated CETME data sheet describes the technical features of the Model R as follows:

Length:	665mm (26.2")
Weight:	6.4kg (14.1 lbs)
Rifling: one turn in:	305mm (12")
Muzzle velocity:	690m/s (2,264 fps)
Muzzle energy:	229kg/m (1,656.4 ft/lbs)
Rate of fire:	500 - 600 rpm

612. Left side closeup of the Model R firing port weapon in fig 611, showing markings. courtesy Terry Gander

The Last 7.62mm NATO CETMEs

The Experimental Model D

The Model D was an interim internal project bridging the gap between the adopted Model C and the later Model E.

The Model D was not adopted and was thus never in production, and no illustrations of it have come to hand.

The CETME Model E

613. Left side view of the CETME Model E, marked "F.A. CETME", serial no E-01015*.
courtesy the late Dr Edward C Ezell

The last series of improvements to the 7.62mm NATO calibre CETME resulted in the CETME Model E, of which only a limited series was experimentally produced in 1976.

The Model E was described as a variant of the Model C, with identical functioning principles, and maintaining a high percentage of interchangeable components.

The principal differences between the Model C and the Model E included the following:

1. a new and more secure method of attachment of the barrel.
2. a redesigned drum-type four-position rear sight, resembling the German G3 diopter sight, graduated from 100 to 400 metres and adjustable for windage, whose base provided for the secure attachment of a new optical sight, designed expressly by Empresa Nacional de Optica SA.
3. elevation adjustments made by screwing in or out the redesigned concentric front sight post, which replaced the older eccentric post of the Model C.
4. a strengthened one-piece buttstock, better suited to launching rifle grenades, and a new handguard, both made of brown plastic.

An undated CETME data sheet describes the technical features of the Model E as follows:

Length:	1,015mm (40")
Weight:	4.3kg (9.5 lbs)
Barrel length:	450mm (17.7")
Rifling: one turn in:	305mm (12")
Number of grooves:	4
Sight radius:	580mm (22.8")
Weight of 20-rd magazine:	.275kg (.6 lb)
Rate of fire:	550 - 650 rpm
Muzzle velocity:	780m/s (2,559 fps)
Muzzle energy:	293kg/m (2,119 ft lbs)

CETME Rifles in 5.56x45mm

The FUSA-CETME Model L

The CETME Model L retained the same roller lock action as its predecessors, with differences in cam angles and component masses as dictated by the unique characteristics of the 5.56mm cartridge. The firing mechanism of the initial version was redesigned to feature a unique but short-lived burst limitation device accessible by the operator (figs 615 and 616).

External features, such as the one-piece plastic buttstock and the diopter rear sight, bear close resemblance to those features of the Model E. However there are some interesting changes internally, notably in the pistol grip unit which houses the firing mechanism. No longer a frame containing a box to house the trigger group parts, the firing mechanism of the Model L is the bare box itself, which when

614. Left side view of the 5.56mm CETME Model L, with accessory bipod and optional optic sight attached.
courtesy the late Dr Edward C Ezell

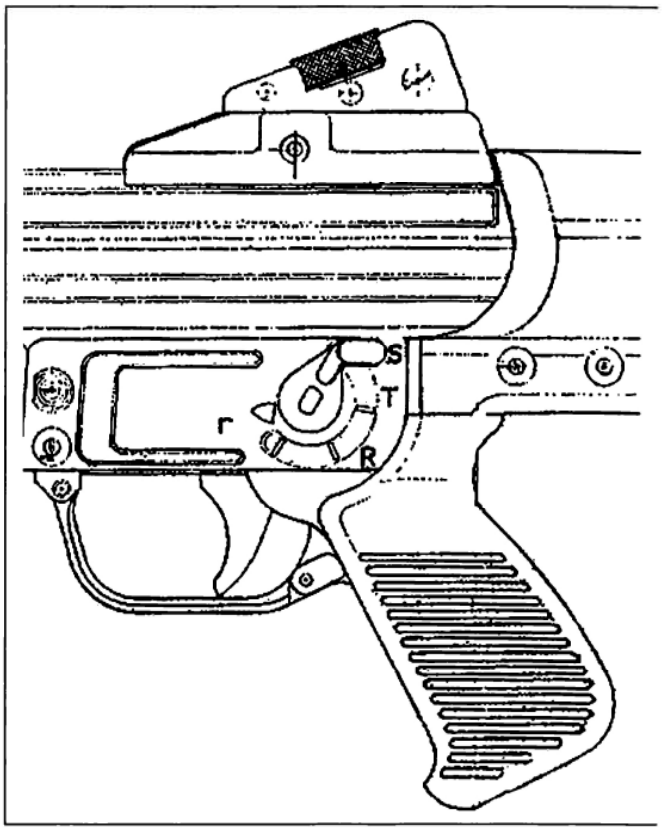
assembled is housed between two plates which extend from the stamped upper receiver (figs 619 - 620).

At least two versions of the Model L and LC (discussed below) have been produced. The earlier Model L featured a four-position diopter rear sight with settings at 100, 200, 300 and 400 metres. The earlier version can be identified by the full-length plastic handguard, which runs from above the magazine well right up to the front sight block. A straight 25-round magazine was initially provided.

The later version features a two-position (200 and 400m) diopter rear sight with two tritium points, one on each side, as well as a tritium point along the line of sight for use in low light conditions. The rear sight is adjustable for windage and the front sight for elevation in much the same manner as the original AR-15 or M16, by using the point of a bullet to depress a spring-loaded pin in each assembly and thus rotate the adjustment wheel (rear sight) or sight blade (front sight). A prominent knurled button housed in the right side of the rear sight unit operates as a bolt holdopen (fig 618).

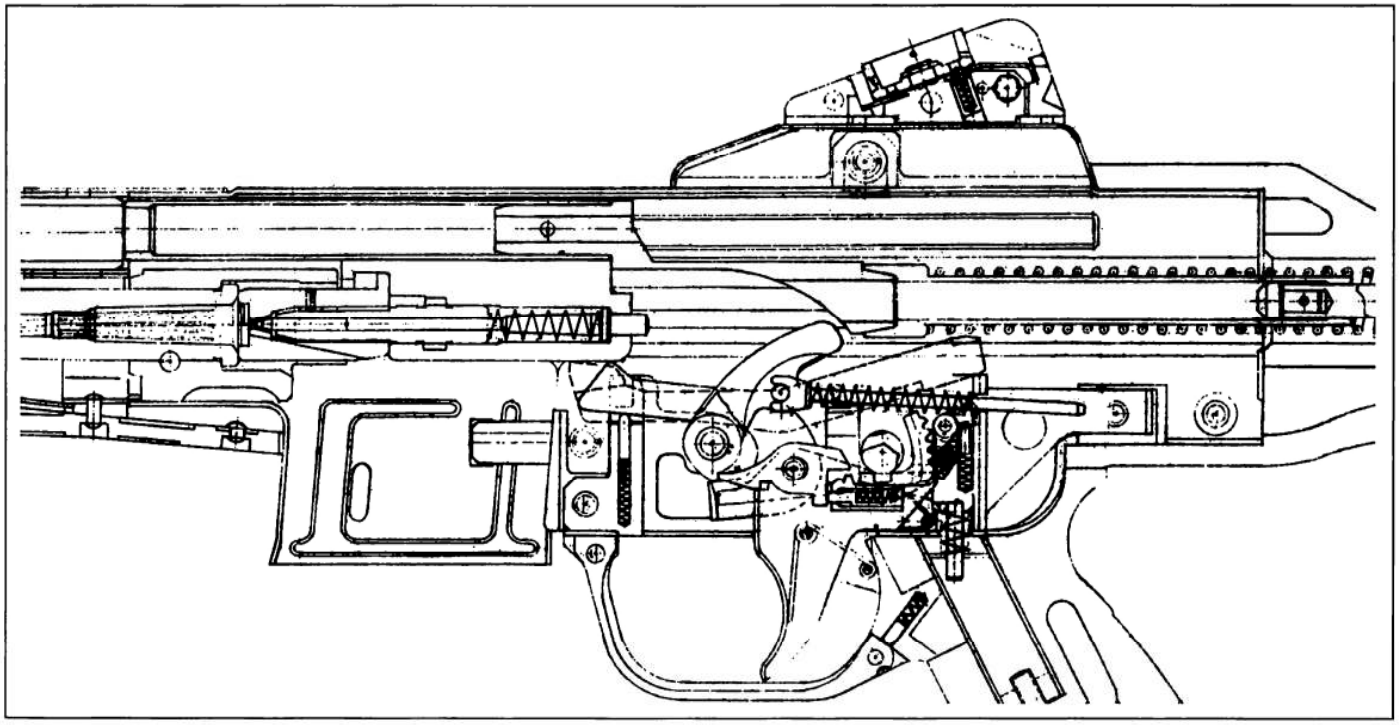
The later plastic handguard (fig 622) features an interior metal sleeve, the front end of which is exposed for improved heat dissipation. The variable burst firing mechanism was no longer offered, and the late Model L is a conventional selective-fire weapon with a three-position selector: S = Safety, T = Single shot, and T = Burst fire.

Two sizes of magazines were latterly available, for 12 or 30 cartridges, both of which are compatible with other 5.56mm calibre weapons such as the ubiquitous M16 series.



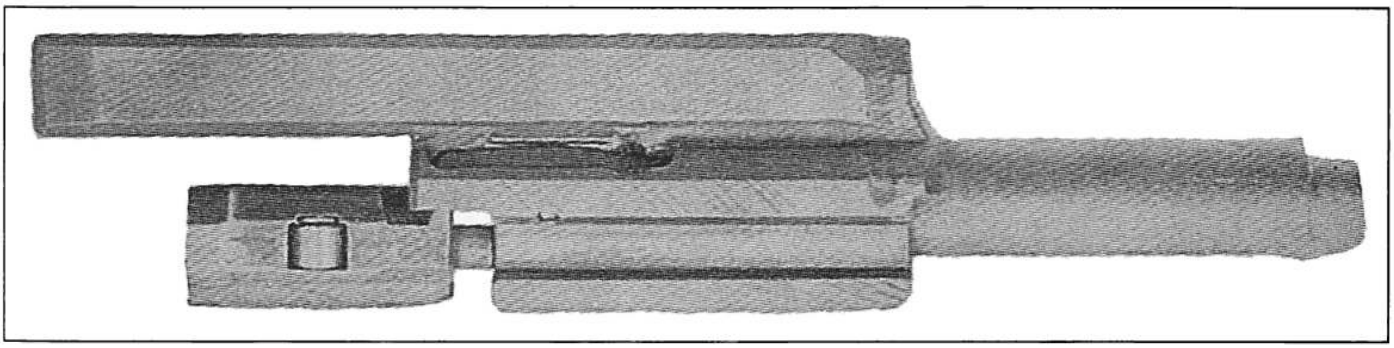
615. Closeup drawing of the left side of the early version of the CETME Model L, showing the four-position change lever.

Note the lever at the rear of the triggerguard, which allowed the operator to select the number of rounds to be fired in the burst setting.
courtesy the late Dr Edward C Ezell



616. Drawing of a sectioned closeup of the left side of the early CETME Model L, showing the components of the variable burst mechanism.
courtesy the late Dr Edward C Ezell

Technical Characteristics of the CETME Model L

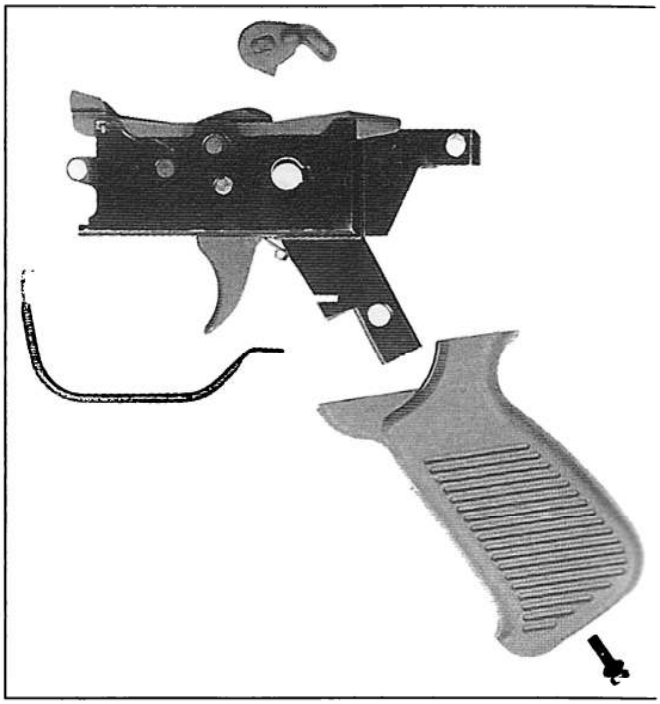


617. Left side view of the bolt assembly of the CETME Model L.
Note the locking rollers, at left, and the simplified design of the bolt carrier.
courtesy the late Dr Edward C Ezell

The CETME handbook no MO-01, titled *FUSA-CETME L Model 5.56x45 Maintenance and Operation Manual* lists the following technical characteristics which were common to both early and later versions of the Model L:

618 (right). Illustration from the CETME Model L manual, showing the method of engaging the bolt holdopen (arrow) while the bolt assembly is being held back by the charging handle. courtesy the late Dr Edward C Ezell

619. Manual illustration showing removal of the trigger group from the receiver of the CETME Model L.
courtesy the late Dr Edward C Ezell

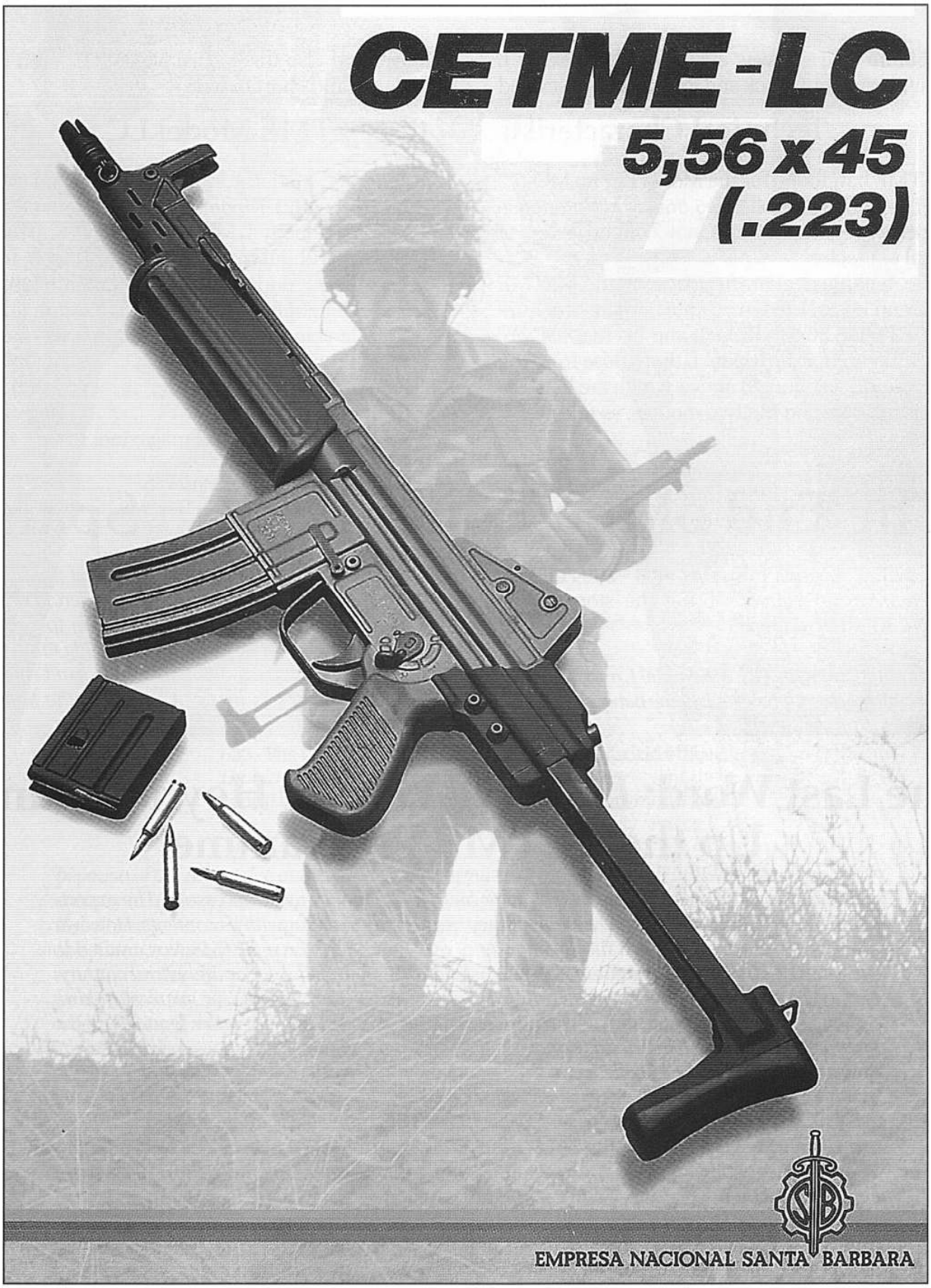


620. Manual illustration showing the CETME Model L pistol grip and triggerguard disassembled from the trigger group. courtesy the late Dr Edward C Ezell

Weight without magazine: . . 3.4kg (7.5 lbs)
Weight of empty 30-rd magazine: 210g (.46 lb)
Weight of full 30-rd magazine: .56kg (1.23 lbs)
Length: . . . . . 925mm (36.4")
Barrel length: . . . . . 400mm (15.75")
Sight radius: . . . . . 440mm (17.3")
Calibre: . . . . . 5.56x45mm NATO

Muzzle velocity: . . . . 875m/sec (2,871 fps)
Rifling: . . . 6 grooves, 1 turn in 178mm (7")

The FUSA-CETME Model LC



621 (previous page). A Spanish soldier in the prone position with the early version of the short CETME Model LC. Note the plastic handguard extends right to the front sight block. courtesy the late Dr Edward C Ezell

622. A coloured single-page brochure illustrating the short-barrelled CETME Model LC.

The late version in the foreground is fitted with a short handguard reminiscent of that on the FNC rifle, while the soldier in the background is actually carrying the earlier version. courtesy the late Dr Edward C Ezell

The 5.56mm CETME was available in the basic L Model with rigid buttstock and long barrel, described above, and also the special Model LC, with retractable butt and short barrel.

Technical Characteristics of the CETME Model LC

The CETME handbook for the Model LC, no MO-02, titled *FUSA-CETME Mod LC 5.56x45 Maintenance and Operation Manual* does not contain a list of technical characteristics.

The technical characteristics of the CETME Model L and LC as listed in a Santa Bárbara brochure titled "CETME 5.56mm Rifle, L and LC Models" are slightly different for the Model L than those from the CETME handbook, quoted above,which are listed as comparisons between the two models, as follows:

Length, L Model: . . . . . 925mm (36.4")
Barrel length L Model: . . . 400mm (15.75")
Muzzle velocity L Model: . 920m/s (3,018 fps)
Weight without magazine: . . 3.6kg (7.9 lbs)
Length, LC Model: . . . . . 665mm (26.18")
Barrel length LC Model: . . . . 320mm (12.6")
Muzzle velocity LC Model: 850m/s (2,789 fps)
Weight without magazine: . . 3.4kg (7.5 lbs)
Rate of fire: . . . . . 700 - 800 rpm
Rifling: . . . . . 6 grooves
Weight of empty 20-rd magazine: 200g (.45 lb)

The End of the Roller Lock in Spain

The following excerpts from the 2003 - 2004 edition of *Jane's Infantry Weapons* bring the story of the Spanish CETME to a close:

. . Production [of the CETME Model L and LC] for the Spanish armed forces took place between 1986 and 1991 . .

In late 2001 it was announced that Santa Bárbara, following its acquisition by General Dynamics of the USA, had changed its title to General Dynamics Santa Bárbara Sistemas [fig 604].

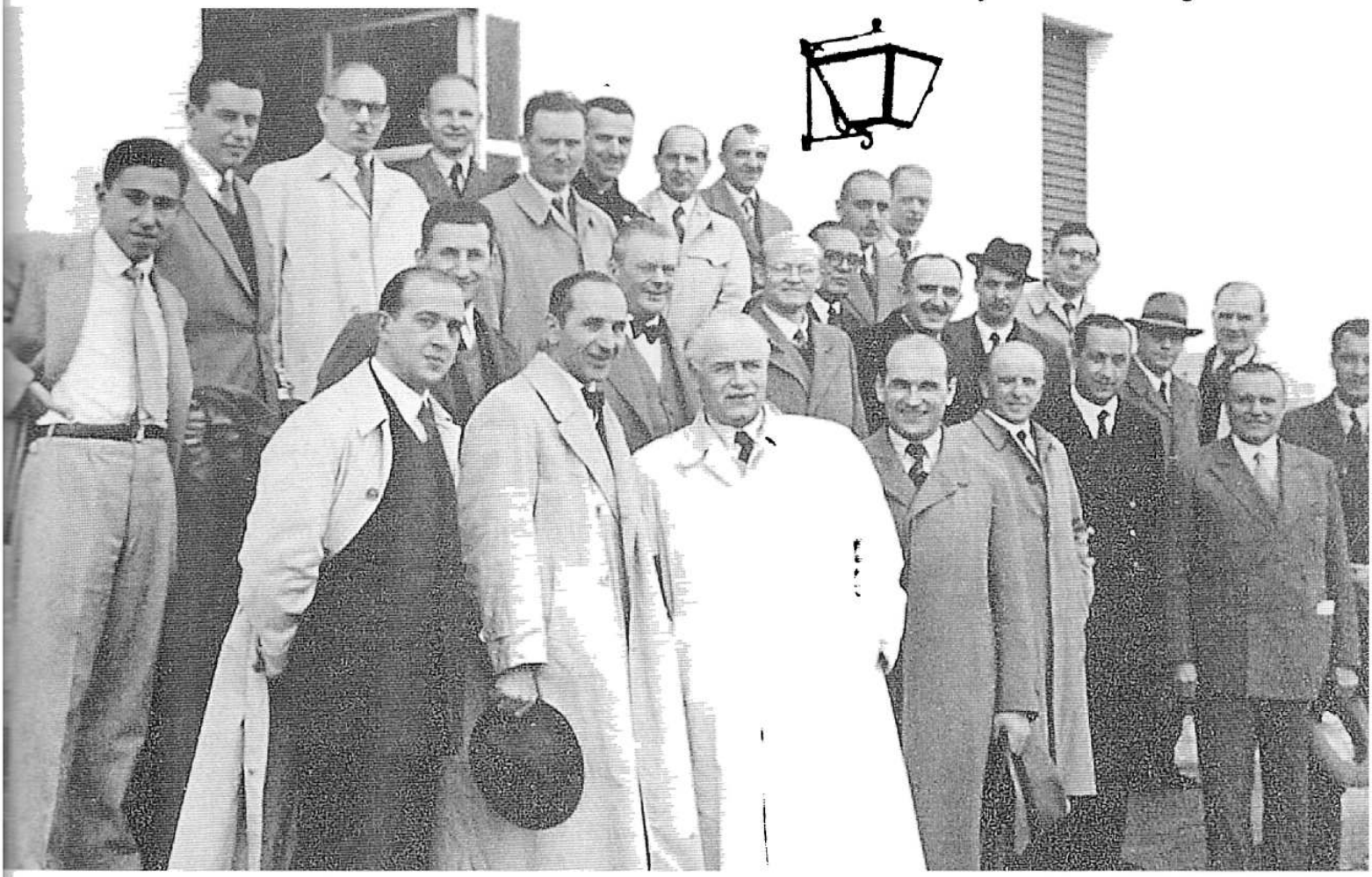
. . The German 5.56mm G36 assault rifle has been selected as the replacement for the Model L and LC rifles . .

The Last Word: *Dipl-Ing* Werner Heynen Sums Up the CETME Programme

. . This historical recounting of events may seem to the reader as unnecessary. The experts in the field will find nothing new herein, as they are already familiar with its contents. However it may be a surprise to learn that twelve years ago [in 1950], when CETME was created to study and then begin the development of its assault rifle, Spain was not an industrial country; neither has the degree of its industrialisation yet reached the present European standard. Although mentioned above this fact shall however be repeated here, in order to measure the magnitude of the work executed. Consider: aside from the goodwill of all co-workers and the remarkable theoretical knowledge of the engineers, no other necessary precondition for the execution of such a project then existed. Offices, research labs, ballistic measuring devices and even a production shop had to be erected, personnel with many basic talents had to be trained and their expertise developed, and a corresponding organisation had to be created. In all this it was necessary that the personnel collect and maintain practical experience, so that essential expertise should not be lost.

Additional tasks for CETME, which was originally only to be responsible for designing the weapon and cartridge, were created by the necessity to oversee the preparation for series production, and eventually to undertake this production as well. These are areas of work that actually have very little in common with theoretical technicalities. Let me just remind the reader of the various contract negotiations, the activities of buying and selling, and the like.

It should be stressed that in Spain one could not, as in many highly-industrialised European countries, go and buy certain standardised parts in almost every store; nor can such be done in Spain even today. The acquisition of materials, whether special shapes or drawn pipes of a certain quality was not always possible, and yet special small runs were not supportable



623. The CETME team on the steps of their Madrid office. *Dipl-Ing* Werner Heynen (in white raincoat) poses in the centre forground, with a smiling Ludwig Vorgrimler at his side. courtesy *service K*

because of the high price demanded by the suppliers. To acquire such materials from a foreign country in times of strict currency controls was difficult if not almost impossible, and demanded the circumvention of a great deal of red tape. It is necessary to mention this, because today the situation has changed considerably.

Another hindrance, of course, concerned matters considered "natural disturbances", particularly the bleak periods of power loss, which in some years lasted a full three days per week. Political influences also had their effect on the progress of work, equally so the various changing dispositions caused by the buildup of the new Bundeswehr. *Despite all this, "CETME" became an international name in the field of weaponry, and many in expert circles look forward with interest to our new developments.*

This representation was written so that others may learn from the past, and to allow that technically conditioned influences and other developments should also be observed and considered. It was also written to commemorate the vast amount of patience necessary to overcome all the hurdles that were thrown in the way, be they technical, financial, organisational, or even political. A development of this kind is put together out of thousands of tiny details, every one of which, it must be considered, might well have spelled success or failure.

At the 20th anniversary of the founding day, the president of INI, the Marquéz de Suanzes, declared that all the difficulties that opposed the buildup of a national industry could only have been overcome by the unshakeable belief in the industrial future of Spain; a belief, indeed, that was always kept alive by the leadership as well.

I shall consider the penning of these few lines to have been well worthwhile if they impart at all the difficulties that CETME has overcome in its twelve years of existence.

Madrid, March 1962

Chapter Twenty-seven

The Semi-Auto CETME "Sport"

The Initial Examination

By 1963 it had been perceived by the Mars Equipment Corporation of Chicago, purveyors of "foreign and domestic firearms" to the US sporting and collector community, that a market existed in the United States for a sporting version of the CETME rifle (i.e., one acceptable to the authorities as capable of semi-automatic fire only).

An initial set of modifications was duly incorporated into a sample CETME Model B rifle, and this was exhibited to the Director of the Alcohol & Tobacco Tax Division (A&TT) of the Treasury Department on March 14, 1963.

The lengthy saga of what followed is told through excerpts from documents kindly provided by Leslie E (Les) Field, a well-known arms researcher and military historian, who at that time was the Secretary of Mars Equipment Corp.

Portions of a letter from Mars President Sig Shore dated March 23, 1963, addressed to the Director of the A&TT to the attention of the Firearms Division, detail the conduct and outcome of the March 14 initial meeting, as follows:

Re: CETME "Sport" Rifles

On March 14, 1963 you will recall that Mr [Les] Field appeared at your offices as a representative of the Mars Equipment Corp to show you a sample of the CETME Sport rifle, to have this rifle examined by technical experts of your choice and, if necessary, fired to demonstrate its functioning. Present at this meeting were Mr Oscar Neal, the Chief of the Firearms Division, Mr Shaw, Counsel for the Firearms Division, and Mr Albert Lizza, of the Design Section of the Research and Engineering Division of Springfield Army (US Army Ordnance), acting as the technical expert for the Department. I am sure that you will also recall that our discussion occupied several hours during which many suggestions were proposed and which finally resulted in certain proposals on our behalf and stipulations mutually concurred in by the parties . .

I believe that it was conceded by Mr Lizza and Mr Shaw that the CETME Sport is a semi-automatic Rifle designed to fire semi-automatically only, and to this extent, not within the purview of the National Firearms Act of 1934 as amended to date. On our part, it was conceded that it was possible to assemble the complete trigger housing group of the G3 (German) full-automatic Rifle to the barrel and receiver of the CETME Sport . . with a possibility of successful firing . . We agree that it would be in the public interest to modify the CETME Sport so that G3 mechanism groups may not be readily attached . .

In order to effect the suggested modifications we propose that the CETME Sport mechanism housing be modified to the following extent:

a. Replace the two bushings at the front end of the housing with different bushings of smaller diameter of hardened material, welded in on the inside surface of the housing.

b. Form out of the side wall of the housing a large depression running up and down the rear portion of the right hand side of the mechanism housing . . so that the

internal cavity in the housing is perceptibly made smaller and so that it is impossible to easily fit the G3 mechanism in the CETME Sport housing . .

We are preparing to supply a sample of the modifications we propose herein, and at the earliest opportunity we will forward it so that you may confirm the exact physical nature of the changes effected. Upon receipt, we would ask that you supply us with an Opinion . . as to its acceptability to the Department . .

The Second Submission

624. Right side view of the first of two altered CETME Model B prototype rifles submitted for A&TT test, serial no B19558.
The conduct and results of this test are included in the text, below. courtesy Les Field

An A&TT memorandum for the file dated September 30, 1964 is excerpted as follows:

Re: Mars Equipment Corp

. . about a year ago we had held the CETME rifle to be a "firearm" under the NFA since it was in basic design a machine gun. The representatives from Mars brought a prototype model of the gun, serial number B19561, which they had redesigned and the specifications for the redesign, but [we] have not test fired the gun. We have asked the representatives of Mars to contact the Chicago office and have the gun test-fired in the presence of a representative of A&TT. Then they are to write a letter asking for a ruling . . and the letter with a report of the test-firing should be forwarded to this office.

We insisted at a prior examination they could not swap any parts from one gun to another. Mr Field told us they would have to send the prototype weapon to Spain for the Spanish manufacturer's use in making other weapons like it. They will then bring the prototype back to the United States and abandon it to the Chicago office. After that, we would like the prototype sent to us.

A subsequent report of the examination of the redesigned rifle, dated October 10, 1964, addressed to the Regional Commissioner of the A&TT in Chicago, signed by a Special Investigator and an Investigator and approved by the Chief of the Enforcement Branch of the A&TT, is excerpted as follows:

This report relates to the examination and test of a CETME Rifle, serial no B19561 redesigned for semi-automatic fire only, sought to be imported by Mars Equipment Corporation . .

Statement of Facts

The CETME Rifle is a relatively new Spanish-made weapon designed as and intended to be a military sub-machine gun. It is equipped with a metal foregrip, a bipod, a sling, and a selector switch on the right side of the action frame or trigger assembly. This selector switch has three positions; safe, semi-automatic, and fully-automatic.

On Saturday, October 10, 1964, the undersigned officers inspected and test fired two modified models of the CETME Rifle, serial numbers B19558 and B19561. Both firearms were found to be capable of only semi-automatic fire. In addition, it was found that the selector switch had been moved from the right to the left side of the action frame and now has only two positions marked "S" and "F" for safe and semi-automatic fire.

In addition, it was found that the CETME rifle, serial number B19561 was altered by changing the shape of the action frame housing. The right side of the housing of B19561 has been indented so that it will not accept the action frame of B19558, which we understand is too similar in size and shape to the CETME sub-machine gun to be acceptable to A&TT. Also, the lower front portion of the action frame housing of B19561 has been redesigned. The housing of B19558 is connected to the rear of the magazine well by means of ears which extend over the rear of the magazine well. In B19561 the parts are connected by means of a stud which projects from the rear of the magazine well and fits into a well at the front of the action frame housing.

An independent expert states that alteration of the working parts of both B19558 and B19561 to permit fully-automatic fire would be very difficult for an expert with adequate tools and impossible for an amateur without adequate tools. (Attachment - Signed statement - Jared L Marsh) . .

Conclusion and Comment

The CETME Rifle was obviously designed and intended to be a military sub-machine gun. The revised version sought to be imported is almost identical in appearance and function and we would normally recommend that permission not be granted to import this firearm. However sale of the Colt AR-15 and Hecla [sic: "Heckler (& Koch)"] G3 have both been previously approved by this department and we are convinced that either firearm could be more easily restored to fully-automatic action than the CETME Rifle.

We recommend that Mars Equipment Corporation be permitted to import CETME Rifles identical to the prototype, serial number B19561.

Statement of Jared L Marsh . .

Made October 12, 1964 at 9220 W Ogden Avenue, Brookfield, Illinois to Thomas R Brennan, Special Investigator, Alcohol and Tobacco Tax Chicago Illinois.

I, Jared L Marsh, am the owner and operator of Jerry's Gun Shop. I am a gunsmith and repair and custom make guns. I have been engaged in business for five years, and have repaired firearms for many years as a hobby.

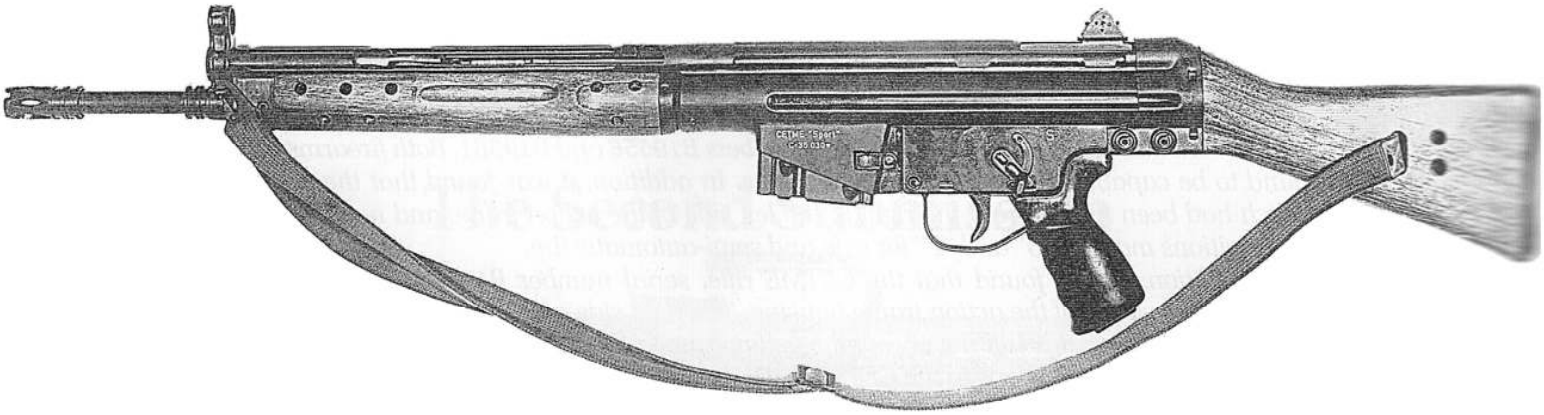
On October 10, 1964 Special Investigator Thomas R Brennan and Investigator Edward Truscksa brought two CETME Rifles to me for my inspection and opinion. They also showed me a Hecla [sic] G3 rifle.

I carefully examined CETME Rifle serial no B19561 and in my opinion it would be very difficult for an amateur to render this firearm full automatic.

I also attempted to insert the trigger group from CETME Rifle B19561 into B19558, and found that these two groups are not interchangeable. The trigger group housing of B19561 has an indentation which will not admit the group of B19558. In addition the group from B19561 is shaped differently from B19558.

In my opinion it would be more difficult to make the CETME Rifle full automatic than it would be to make the Hecla [sic] G3 rifle full automatic.

Back to Spain, and Back Again



625. Left side view of the pilot as produced in Spain for the CETME "Sport" project, serial no C-35030*.
Note the Model C flash hider and four-position rear sight. The rifle is shown fitted with the carrying sling and the optional wooden handguard. courtesy Les Field

Over the remainder of 1964 paperwork was generated by the A&TT which allowed Mars Equipment Corp to return the prototype CETME "Sport" rifle, serial no B19561, to CETME in Madrid to be used as the pilot for the production of further Sport models.

By the time this work was accomplished the development of the military CETME rifle had moved on in Spain, and the initial production sample converted to the semi-automatic configuration was a CETME Model C, serial number C-35030*. This rifle, together with the original Model B prototype, serial no B19561, were returned to Mars Equipment in the spring of 1965, and were the subject of a letter dated April 20, 1965 from Edward Kaplan, the attorney for Mars Equipment Corp, addressed to the Assistant Regional Commissioner of the A&TT in Chicago, which is excerpted as follows:

. . Pursuant to the requirements expressed . . there is submitted two CETME Sport Rifles described as follows on behalf of Mars Equipment Corporation . :

1. *no B19561*
2. *no C-35030* (this is the production prototype being submitted to show conformity in a manufacturer's sense with no B19561).*

The two rifles are identical with the exception of certain, minor production modifications . . as follows:

1. *Changes in the sighting arrangement;*
2. *Omission of the carrying handle;*
3. *A slight change in the form of the muzzle brake;*
4. *A cleaning kit is contained below the front sight . .*

. . We also offer herewith the 5 shot magazine and wooden handguard. These will be alternatively offered where appropriate . .

Importation Allowed

After the examination of the two submitted CETME Sport rifles was concluded, the Acting Assistant Regional Commissioner of the A&TT advised Mars' lawyer, Edward Kaplan, as follows on June 9, 1965:

. . We have examined prototype CETME Rifle, serial no B19561 and production model CETME Sport rifle serial no C35030, and find them capable of semi-automatic fire, only. Furthermore, they do not appear susceptible to ready conversion to fully automatic fire. Therefore, the CETME Sport Rifle is not within the purview of the National Firearms Act, if manufactured in exact accord with the [submitted samples].

It is our understanding that your client has relinquished all claim to prototype CETME Rifle, serial no B19561, and that we are to retain this firearm for possible use in comparison with later production models . . We have no further use for CETME Sport Rifle serial no C35030, and your client may call for this firearm at his convenience . .

The Production Contract with CETME

626. Right side view of a typical example of the 1,254 "S"-prefix serial number CETME "Sport" models imported from 1966 through February 18, 1971. Note the rubber recoil pad, the five-shot magazine and wood handguard, and the vertical ridge impressed through the trigger housing area. This example is also fitted with the optional telescopic sight. courtesy Les Field

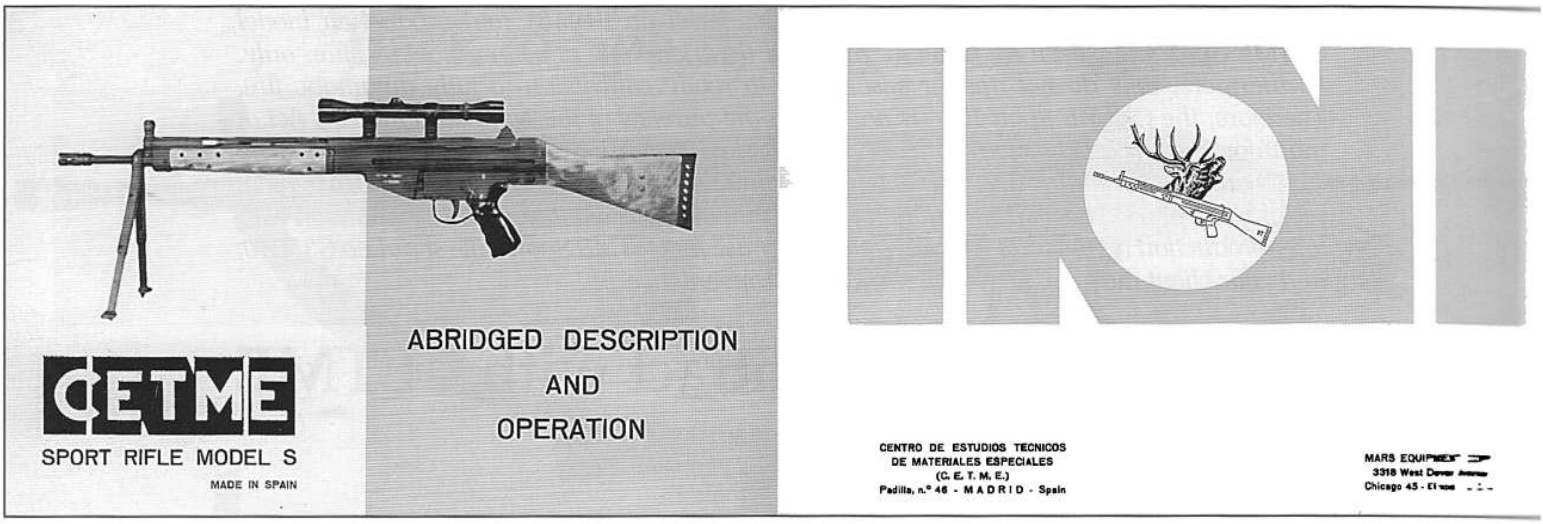
With the configuration of the CETME "Sport" rifle thus approved by the A&TT, a detailed nine-page contract was prepared, dated January 1, 1966, between Empresa Auxiliar de la Industria, SA, AUXINI, of the *Departamento de Ventas al Exterior* (Department of Foreign Sales) representing CETME, and the Mars Equipment Corporation of Chicago, covering the manufacture of a minimum quantity of 500 CETME "Sport" rifles "in accordance with a production model . . bearing serial no C35030", which Mars agreed to purchase and have the sole and exclusive right to sell in the United States.

The price agreed for each basic rifle purchased during the first year of what was expected to be a five-year agreement was $108.25, FOB the Madrid airport in Spain, with the price of telescope sight mount bases and other accessories to be mutually agreed.

Further clauses covered payment terms, inspection and repair, if necessary; spare parts, warranties, contingencies, dispute and jurisdiction, etc, and the right of Mars to use the CETME name "or any trade name or combinations thereof employed by CETME for the said rifles and other related merchandise to be manufactured by CETME and purchased hereunder from AUXINI during the life of this agreement and any extensions thereof, only."

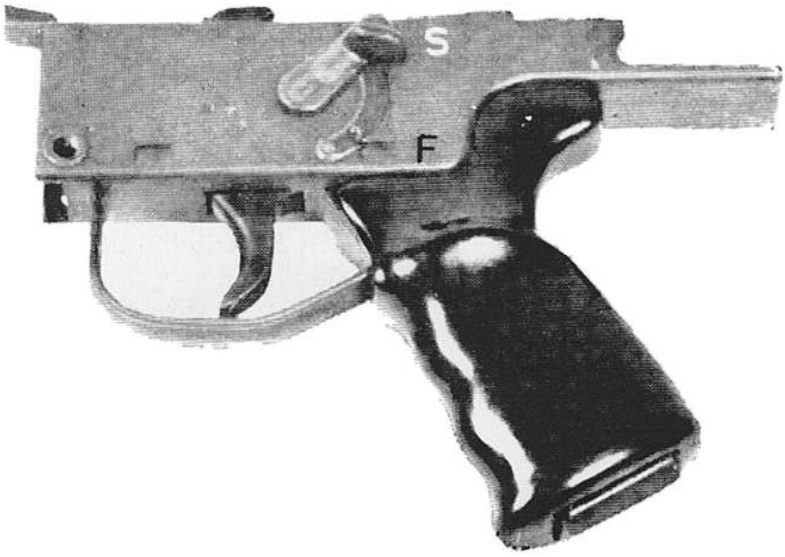
627. Right side closeup of a typical CETME "Sport" rifle, showing markings. MoD Pattern Room collection, photo by Richard Jones

A delivery schedule for the first year's production was appended, calling for 50 guns to be shipped on the 15th day of each month from February through November, 1966, for a first year total of 500 CETME Sport rifles.



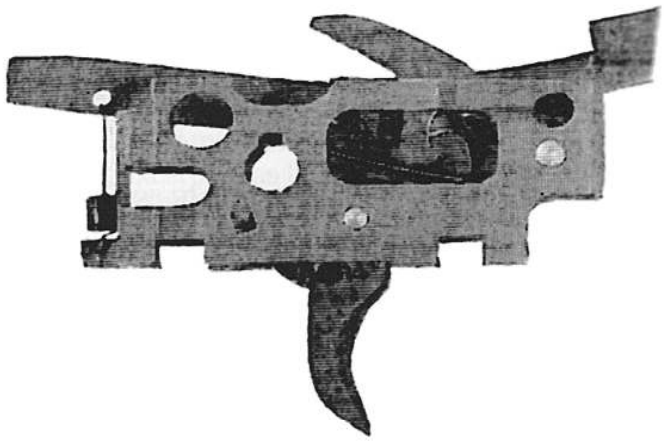
628. The front and rear covers of the Model "S" Sport Rifle handbook, produced by CETME/INI in Madrid exclusively for Mars Equipment Corp of Chicago.
courtesy the late Dr Edward C Ezell

The Official List of Changes



629. Left side view of the dedicated pistol grip assembly for the Model "S" CETME Sport.

Note the Fire and Safe selector positions, and the configuration at the lower front which ensures that neither upper nor lower receiver is interchangeable with the selective-fire military model.
courtesy the late Dr Edward C Ezell



630. Right side view of the semi-auto only trigger housing assembly for the CETME Sport.

Note the cutout at the front. This plus the vertical ridge at the rear of the unit, which matches the ridge in the right side of the lower receiver shown in fig 626, ensure that a selective-fire housing unit will not fit into the lower receiver of the Model "S".
courtesy the late Dr Edward C Ezell

The official listing of all the modifications made in the A&TT-approved semi-auto only CETME "Sport" model was as follows:

Changes Between the 1963 Original CETME and the CETME "Sport" (1965)

1. *Alter lower receiver to accept connecting pin through secondary sear area.*
2. *Alter upper receiver to provide extension for new position of connecting pin.*
3. *Impress a groove from top to bottom of lower receiver through secondary sear area of lower receiver, by building a special die to do this operation.*
4. *Form trigger mechanism sub-unit to fit "Sport" lower receiver above described.*
5. *Omit lever magazine catch assembly, and secondary sear, and carrying handle.*
6. *Alter front tube cap to omit bayonet catch.*
7. *Alter rear sight, and weld telescope mount bases to receiver.*
8. *Alter bolt carrier to omit cam for secondary sear.*
9. *Alter hammer to omit notch for secondary sear.*
10. *Alter lower receiver to only offer "Safe" and "Fire" by manufacturing a new die to strike the same.*
11. *Supply alternative wood forend.*
12. *Supply new recoil/flash muzzle attachment of smaller diameter.*
13. *Supply new sporting type rubber butt pad.*
14. *Supply new telescope mounts.*
15. *Verify that angle on firing pin carrier adapts unlocking action to all commercial .308 ammunition of every bullet weight and all NATO ball ammunition.*
16. *Supply five-shot magazines.*

CETME "Sport" Sales Totals and Prices

During the period March 11, 1965 through February 18, 1971, it appears that a total of 1,258 CETME rifles were imported into the United States, usually in lots of 50 or 100. This total is made up of 1,254 CETME "S"-prefix serial number "Sport" models, 854 imported prior to the 1968 GCA (Gun Control Act) and 400 thereafter. In addition, three original CETME rifles had been imported before the inception of the "Sport" model, one of which was the original prototype rifle no B19561 which had been abandoned to the Treasury Department as a sample, and one demonstration cutaway "Sport" model imported on January 14, 1967.

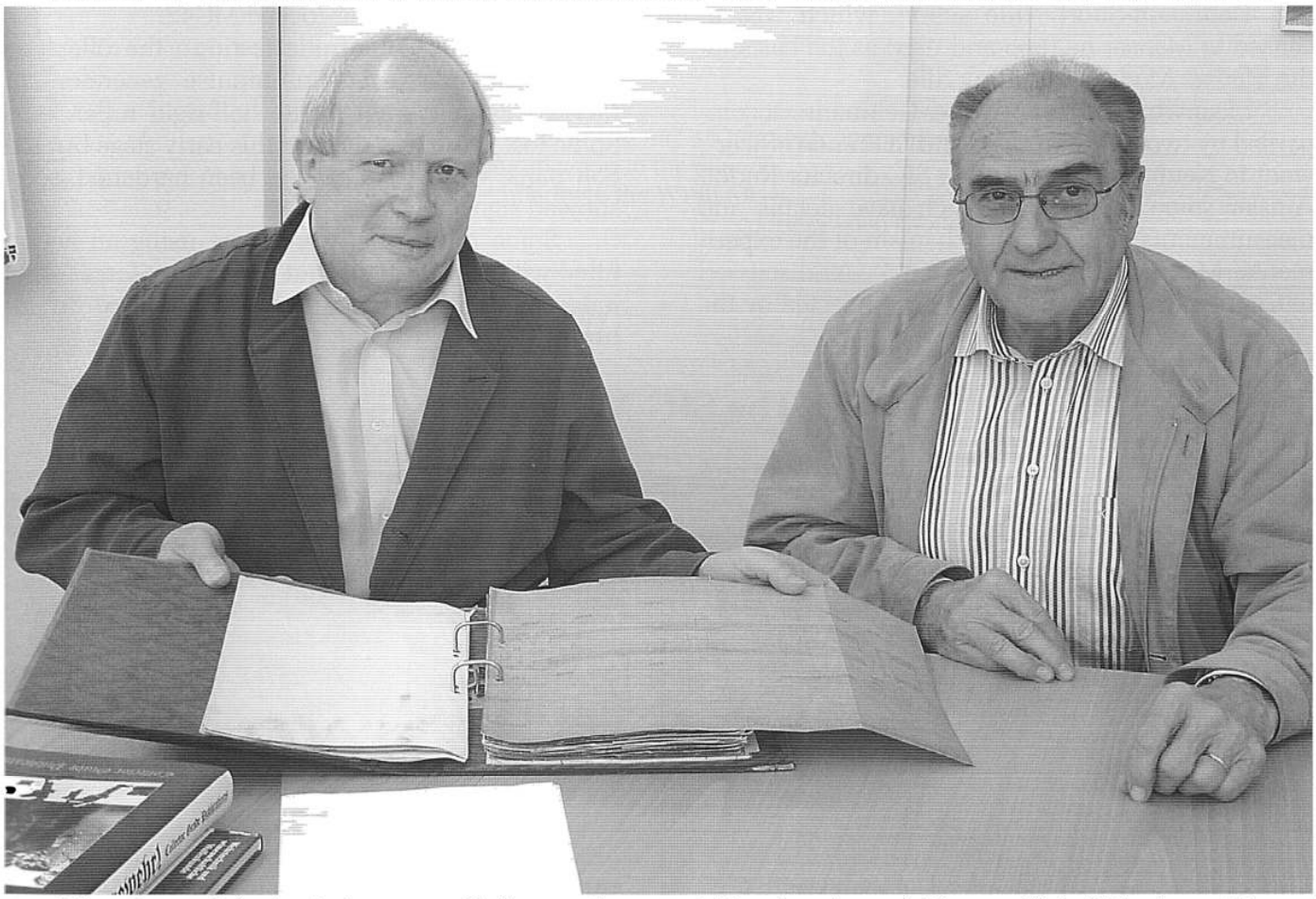
The retail price of the CETME "Sport" rifle with one five-shot magazine, including bipod and sling, fluctuated upward from an initial $164.95 through $218.00 and finally, through Mars' successor company, Centennial Arms Corp, $239.95 with sling, with a detachable adjustable bipod offered separately for an additional $19.95.

Part IX: Other Roller Locks

Chapter Twenty-eight

The Roller Lock in Switzerland

The Postwar Adventures of the Mauser MG45

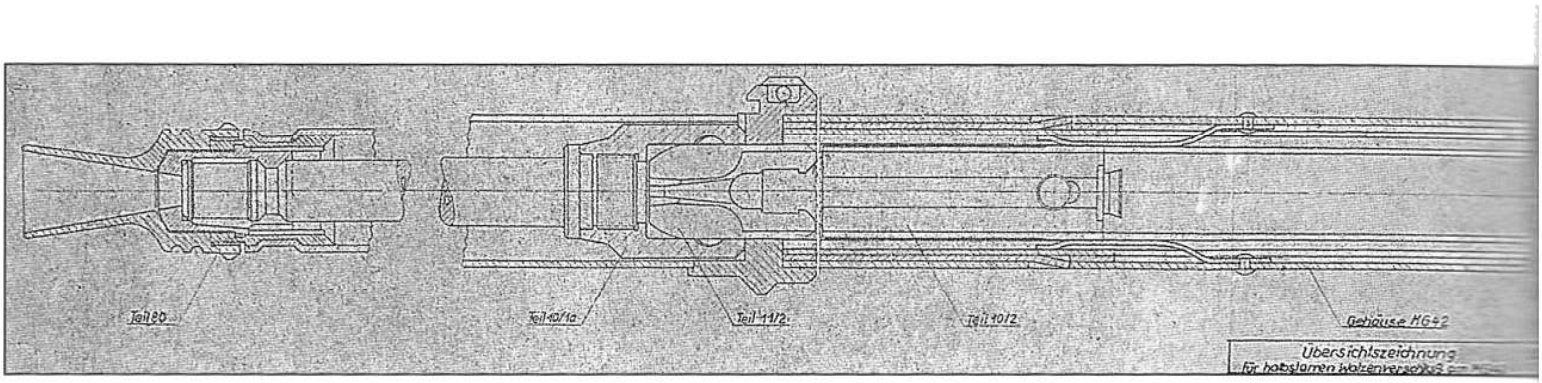


631. Léon Crottet, left, the Swiss gunsmith famous for producing exquisite half-scale firing miniatures of military small arms, and Roman Freiermuth, sales manager of Swiss Arms AG, displaying the re-discovered Mauser MG45 drawings which are still held in the archives of Swiss Arms AG in Neuhausen.

The story of how the Mauser MG45 came to Switzerland is told in the text. courtesy Léon Crottet

The following story is as recollected by a leading German gun designer who worked for many years at the *Schweitzerischen Industrie-Gesellschaft* SIG), with some additions and amendments.

In the 1950s the noted German Olympic target-shooting champion of the Nazi era, Walter Gehmann, whose story is told in some detail in the Collector Grade title *Mauser: Original Oberndorf Sporting Ri-*



632. A Mauser plan drawing circa 1944, showing a top sectioned view of the MG42 fitted with a roller lock and fixed barrel. Other views from this rare set of drawings appear as figs 93 and 94. Swiss Arms AG archive, courtesy Léon Crottet

fles, designed and patented the ingenious, telescoping "Gehmann-Short" rifle action, which was licensed to Mauser in 1965 and used as the basis for the Mauser Model 66 hunting rifle.

Meanwhile, in 1953 Walter Gehmann, accompanied by two of his brothers and "a French officer", went to Neuhausen and sold to SIG director Rudolf Amsler some blueprints, which gave details and measurements of the bolt mechanism of the experimental Mauser roller-locked "MG45". As discussed in Chapter Six, this design had been rejected by the *SKInfWaffen* in August, 1944 in favour of the Grossfuss version of the roller-locked MG42.

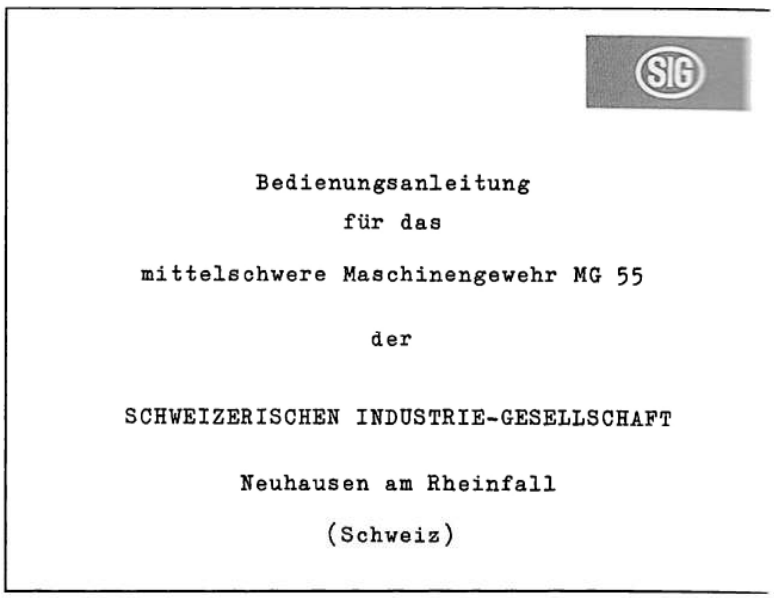
At SIG, after some initial testing of the roller lock action principle using an impulse generator, an MG42 was converted to the half-rigid roller lock. Some test firing was done at this early stage but the bolt parts, which had not yet been hardened, soon showed signs of wear.

Some other tests were done using an action fitted with locking flaps, but the friction forces were judged too high and these investigations were discontinued.

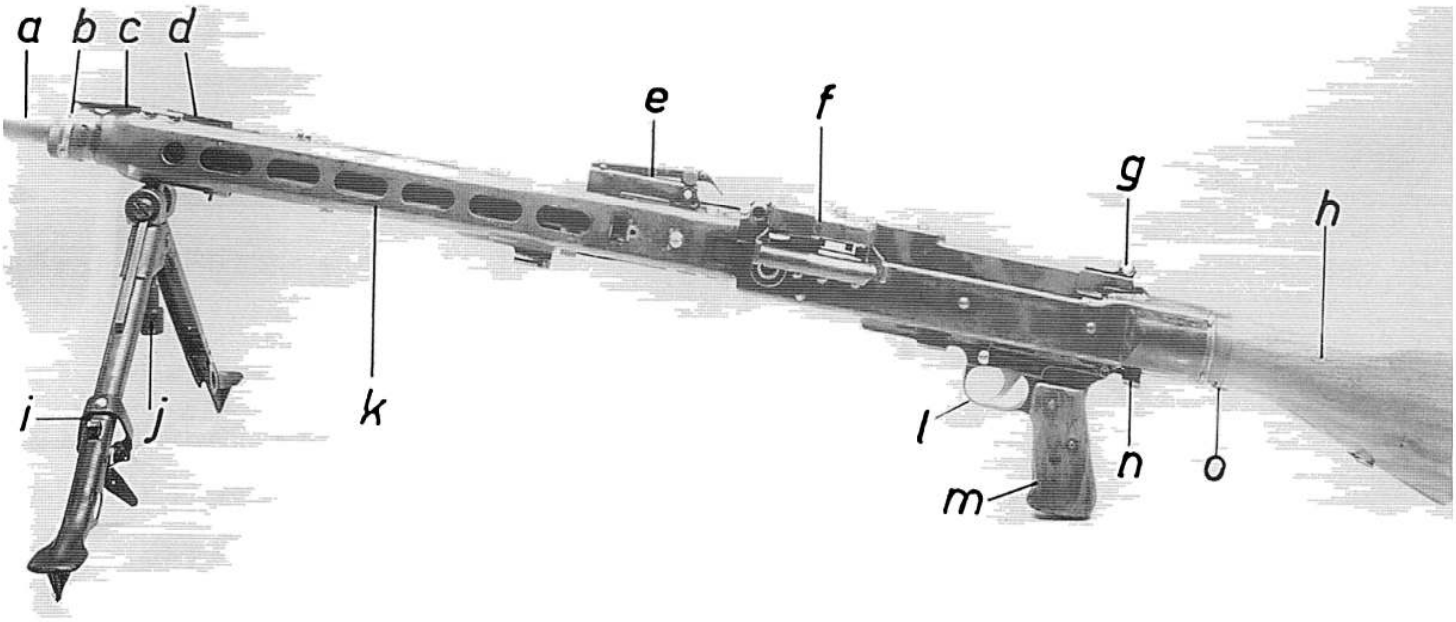
The SIG MG55

The initial complete experimental machine gun produced by SIG embodying the roller lock action was called the MG53. Tests were only partially successful, due to the fact that no *Rückprallsperre* (bolt rebound damper) had yet been incorporated.

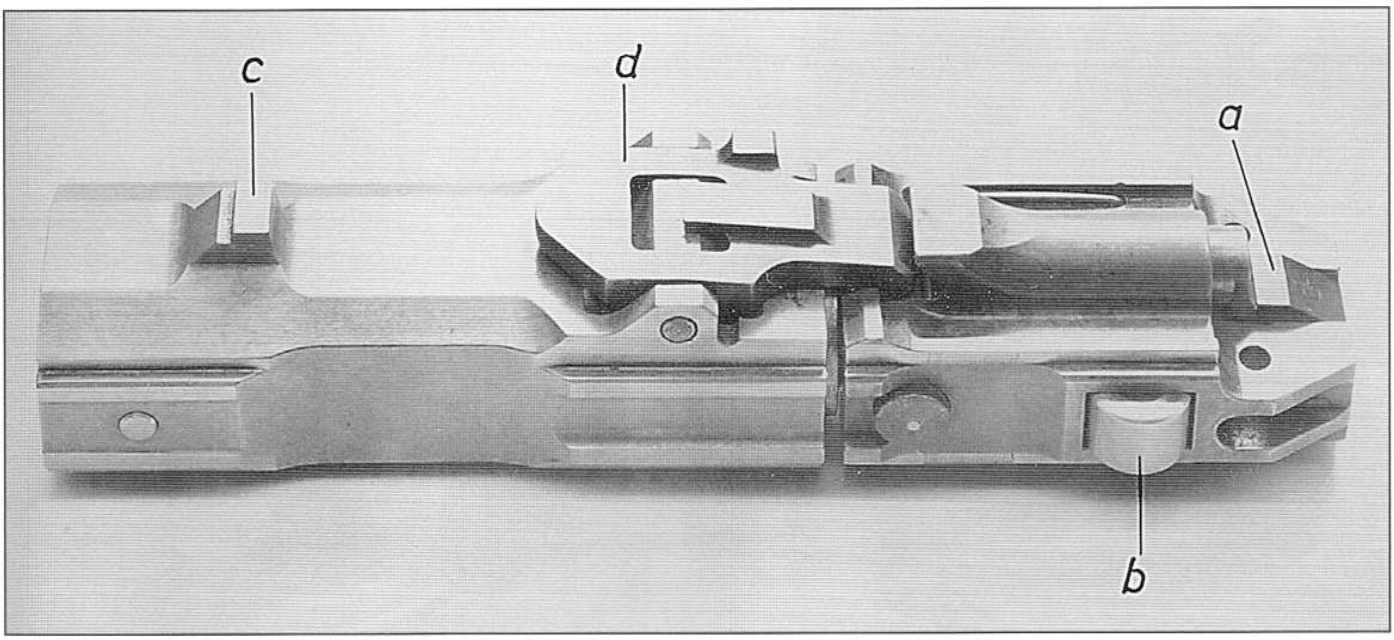
This was soon rectified in an improved version known as the MG55, which was the first postwar SIG machine gun developed to the point of being featured in a manual.



633 (right). The typescript cover of the small illustrated manual produced on the SIG MG55. courtesy Léon Crottet



634. Left side view of the SIG MG55, with components lettered for identification in the manual.
Note the similarity to the WWII MG42.
courtesy Léon Crottet



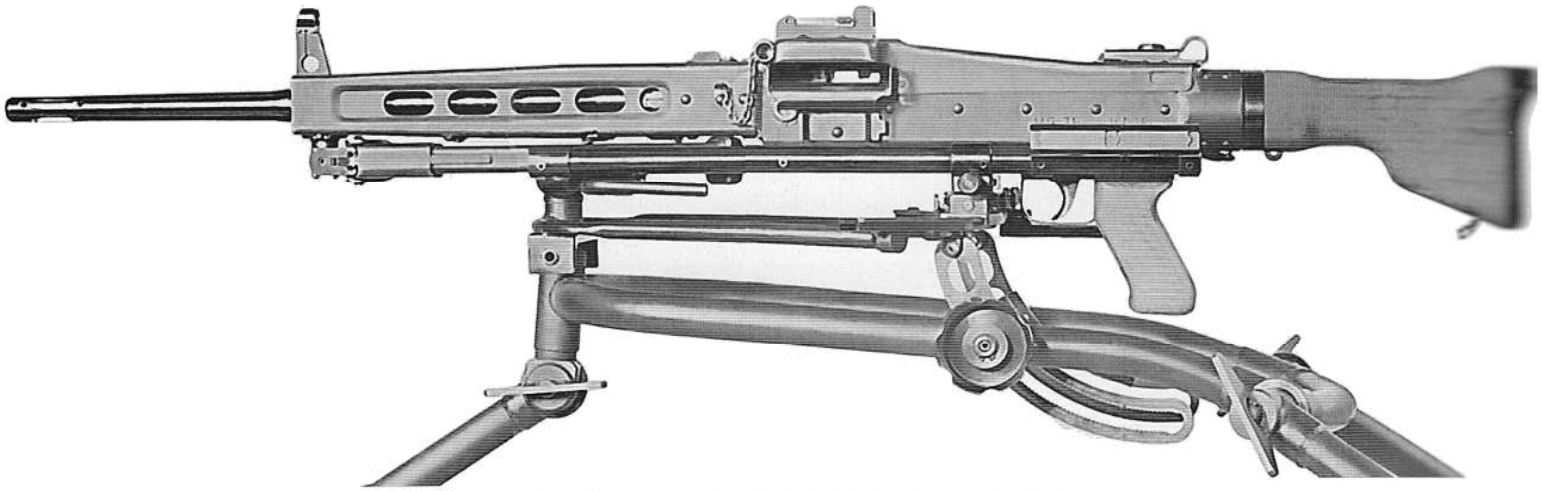
635. Right side view of the bolt assembly of the Swiss MG55. The lettered components are as follows:

a. extractor
b. locking roller
c. feed lever stud
d. rebound catch.

Compare with fig 96: the similarity between this post-war design and the wartime Mauser MG bolt is obvious.
courtesy Léon Crottet

636. Right side view of the SIG MG55 mounted on its tripod.
© *Informations- und Medienzentrale der Bundeswehr*

The Final Version: the SIG MG710



637. Left side view of the SIG MG710-3, a roller-locked design with a half-jacketed non-recoiling barrel, like the Grossfuss MG42V. courtesy the late Dr Edward C Ezell

Further trials with the MG55 led to the development of the MG710, a commercial SIG development which found some markets overseas but was never adopted in Switzerland.

The Postwar Swiss Rifle Programme

Early Designs from Bern and SIG

The story of the development of the SIG roller lock rifle is told in excerpts from an edited translation of the 1990 DWJ article *Randfiguren: Die Gewehre G2 und G4 der Bundeswehr* ("Peripheral Characters: the G2 and G4 Rifles of the *Bundeswehr*"), with additional material, as follows.

After the end of WWII, the development of self-loading rifles in Switzerland was shelved in favour of the development of a selective-fire assault rifle. Both the *Eidgenössische Waffenfabrik* in Bern and the SIG factory developed several designs: the Bern arsenal produced two short rifles, one chambered for the 7.5x55mm Swiss GP11 service cartridge and the other for the first version of the 7.5x38mm Swiss short cartridge, designated the Model 47/49. For its part SIG introduced the unorthodox blow-forward AK53 rifle, but none of these developments found encouragement.

The SIG Roller-Locked *Automatikkarabiner* AM55

638. Swiss military officials and other dignitaries witness a trial of two early assault rifle designs.
Left: the Bern StG54, in the standard 7.5mm GP11 calibre. Right: a prototype of the roller-locked SIG AM55.
courtesy the late Ludwig Olson

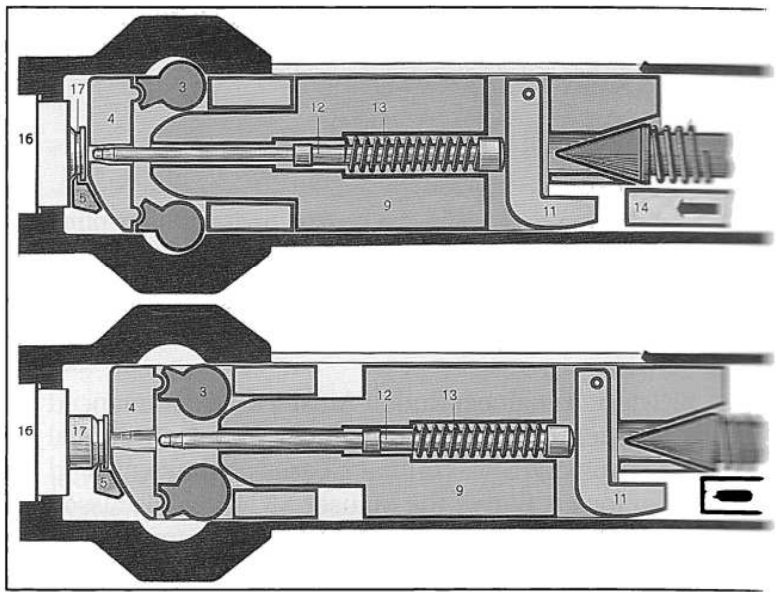
SIG design engineer Rudolf Amsler then commenced a unilateral new development, without an official order from the Swiss military, based on the semi-rigid roller lock action of the Mauser MG45, as discussed above. The first prototypes utilised the same bolt as the MG53, fitted with a rebound compensator like the MG55, with the bolt turned 180° to facilitate feeding from a vertical box magazine positioned under the receiver. The only other modification was the addition of a hammer.

639. Left side view of another early prototype of the SIG roller-locked AM55.
Note the unusual triggerguard configuration.
courtesy the late Ludwig Olson

640. The above prototype stripped. The roller-locked bolt, above, shows its MG55 origins.
Note the unusual metal strap butt, mainspring and buffer assembly, with two removeable wooden side pieces.
courtesy the late Ludwig Olson

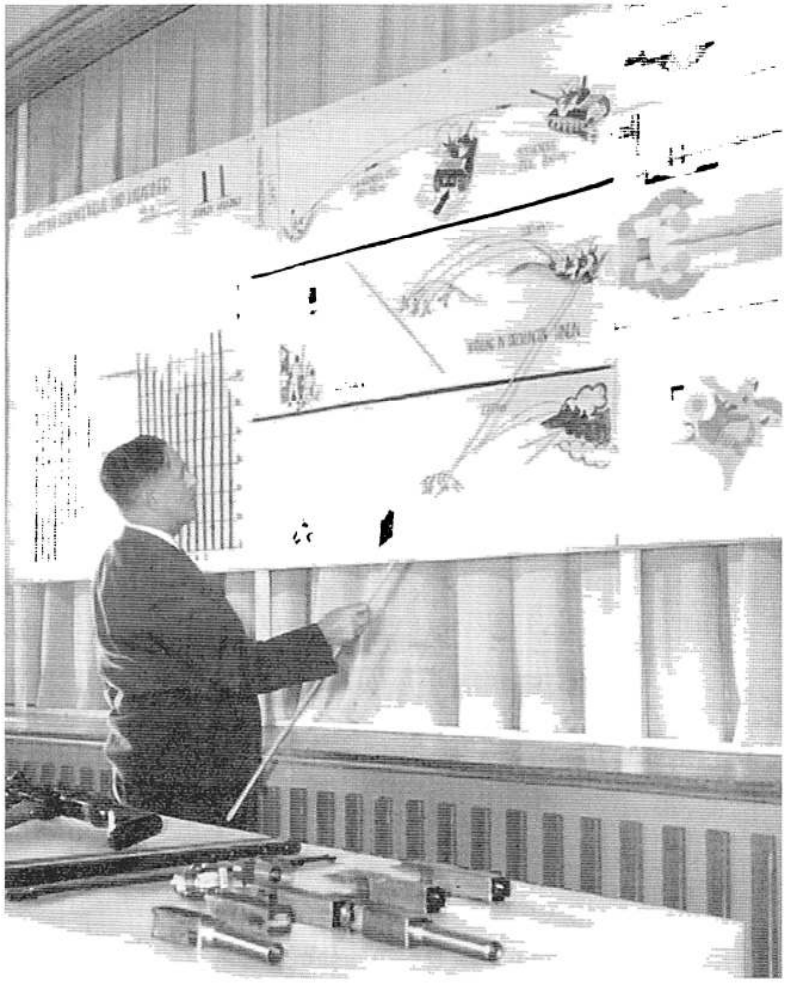
The basic construction was completed in 1954 and the prototype, designated the *Automat-ikkarabiner* AM55, was first demonstrated in May 1955.

Modifying the AM55: the SIG 510 Series



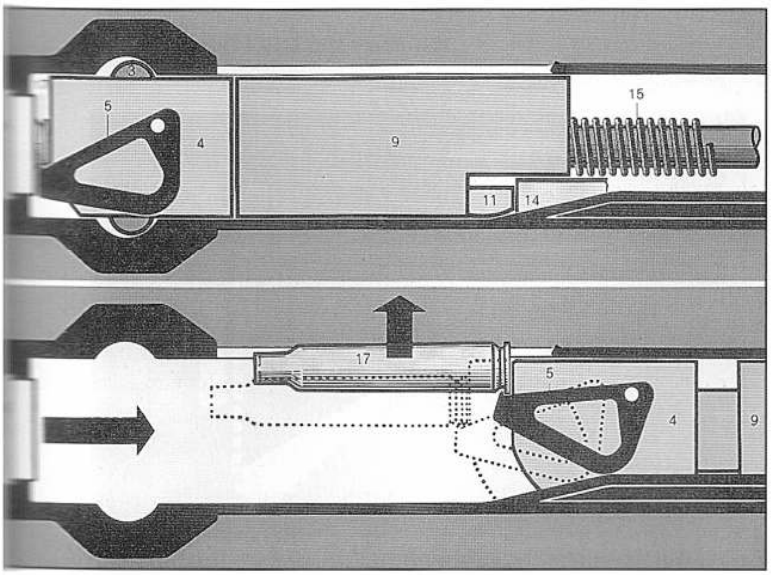
641 (right). Drawings from a SIG catalogue showing two top sectioned views of the bolt assembly of the SIG510.
Above: bolt locked, ready to fire.
Below: bolt unlocked, recoil stroke begun.
Note the modified locking "rollers" are fitted with integral supporting wings, which essentially converts the basic roller action into a flap-locked design with rounded flaps. These produce a longer delay period when pressure is exerted against them, permitting a lighter overall bolt weight.
The G3 bolt weighs 780g (1 lb 11.5 oz), while the SIG 510 bolt weighs only 595g (1 lb 5 oz).
courtesy the late Ludwig Olson

642. A Swiss soldier, in camo combat clothing and distinctive Swiss Army helmet, poses with an early version of the SIG 510 rifle. courtesy the late Ludwig Olson



643. Rudolf Amsler, the Chief Designer of SIG, delivering a lecture explaining the tactical advantages of the assault rifle concept, while at right are diagrams of the action and trigger mechanism of the SIG 510.

An actual rifle is lying on the desk in front of him, and some instructional action components are also laid out in the right foreground. courtesy the late Ludwig Olson



644 (left). Two more top views of the bolt assembly of the SIG 510, highlighting the unusual action of the ejector (part no 5).

Above: bolt locked in firing position, with ejector (in black) positioned alongside base of cartridge.

Below: at rear of action stroke the ejector pivots to the right, cammed by the projection in the receiver, to drive the fired case sideways out of the ejection port.

In firing, the cartridge case pushes the bolt head back without the need for an extractor, so the purpose of the extractor is basically to position the fired case for ejection, although it does serve to allow hand extraction of a chambered live round. courtesy the late Ludwig Olson

645. Left side view of three versions of the SIG 510 rifle, all featuring fold-down sights reminiscent of those used on the WWII German FG42 paratrooper rifle.

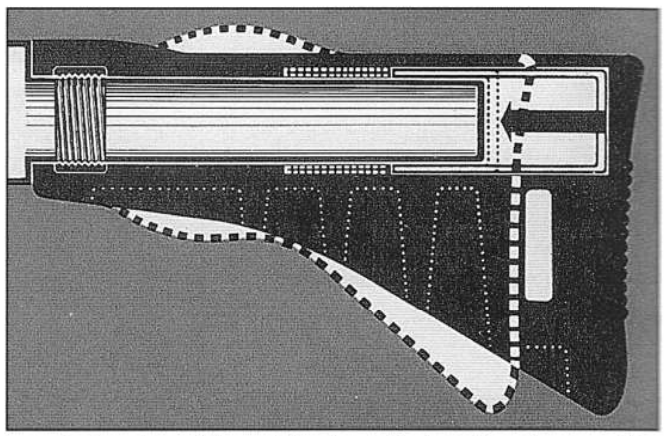
Above: SG 5210-1 (normal version), calibre 7.62mm NATO, with carrying handle and rubber butt. Length: 1,048mm (41.3"); barrel length: 545mm (21.5"); weight: 4,980g (11 lbs).

Centre: SG 510-2 (lightweight version), calibre 7.62mm NATO, with wood butt. Overall length and barrel length are the same as above, but the weight has been reduced to 3,900g (8.6 lbs).

Below: SG 510-3 (version for 7.62mm Swiss short cartridge). Length: 920mm (36.2"); barrel length 450mm (17.7"); weight 4,050g (8.9 lbs).

courtesy the late Ludwig Olson

The Swiss military authorities requested some modifications, including a strengthened barrel capable of launching long-range rifle grenades. The barrel was accordingly provided with an integral muzzle brake and three integral rings of increased diameter, the rearmost of which housed a circle of spring steel wire to hold the tube of the grenade securely. The barrel was also provided with a tubular slotted metal jacket, and the rear sight and cocking handle were modified. A new stronger buttstock was also developed, in order to stand the stress of launching grenades with the rifle propped on the ground.



646. A drawing of the rubber butt depicted on the top rifle above, specifically designed for launching grenades when propped on the ground. Note the dotted outline, showing the butt under extreme deflection.

courtesy the late Dr Edward C Ezell

The SIG 510-4 Becomes the *Sturmgewehr* 57

The modified SIG 510-4 version of the rifle was adopted in 1957 by the Swiss Army in the Swiss standard 7.5x55mm GP11 calibre as the *Sturmgewehr* 57. As discussed in Chapter Thirteen, the version ordered by the German *Materialamt* for trials in 1957 and designated the G2 was chambered for the 7.62x51mm NATO cartridge.

The SIG 510 series of rifles were also offered commercially, with a sporting version, also a derivative of the SIG 510-4, called the SIG AMT.

The SIG 5.56mm SG 530 Automatic Rifle

647. Left side view of the early folding-stock .223 calibre prototype for the SIG 530 series.
The influence of the stamped ArmaLite AR-18 design is quite strong. courtesy the late Dr Edward C Ezell

648. Left side view of the SIG roller-locked .223 prototype, field stripped.
In later versions the mainspring housing was modified and extended to become a gas piston, a gas port was added through the front sight block, and the *Steuerstück* with angled sides was replaced by a parallel-sided part.
courtesy the late Dr Edward C Ezell

A later SIG development project, for a lightweight rifle in calibre .223 (5.56mm), resulted in the SIG 530 series, which while retaining the plain cylindrical locking rollers reverted to gas operation, much as had been done by Rheinmetall with its *Automatisches Schnellfeuergewehr* Rh4, discussed in Chapter Nineteen.

The initial prototype of the SG 530 project, however, depicted here, was a "conventional" roller-locked design with folding stock and no gas system.

Chapter Twenty-Nine

The Aftermarket

Paving the Way

. . It is sometimes necessary to depart from the path of tradition to create a modern product that opens up new perspectives . . [early H&K brochure on the G36 rifle]

By September, 1990, the vaunted G11 and its caseless cartridge had been rejected, leaving the final iteration of the G3, the "G3A3 A1" (discussed in Chapter Seventeen), as the standard German service rifle. By this time most NATO countries had switched to the 5.56mm cartridge, but based presumably on tests of the HK33 the man in charge of Germany's military small arms, Major Sembach, had already declared in the 1980s that the *Heeresamt* would not consider a roller-locked rifle in 5.56mm.

New technical and tactical requirements were issued in September, 1993, and two short-listed candidate weapons squared off for a new series of trials. These rifles were the Austrian Steyr AUG (*Armee Universal Gewehr*) and a new development from H&K called the HK50. Both these rifles made extensive use of plastics, both externally and internally; both were conventionally gas operated; and both featured versions of the ubiquitous Stoner-type multi-lugged rotary bolt.

Adopting the G36: the "Tupperware Rifle"

649. Left side view of the G36 rifle, adopted for German service use on May 8, 1995. Note the lack of iron sights.
The G36 is constructed almost entirely from carbon fibre reinforced plastic, which gives rise to its nickname.
courtesy H&K GmbH

The HK50 was adopted on May 8, 1995, and renamed the G36, this identifier having already been assigned by the *Materielamt*. With the symbolic handover of the new G36 to the German Armed Forces on December 3, 1997, the G3 era officially came to an end. The first batch of production G36 rifles had already been

650. A group of *Kampfschwimmer* (the German equivalent of the US Navy SEALS or British SBS) approaches shore after being dropped off by the vessel in the background. Note the distinctive carrying handles of their G36 rifles.

651 (right). Two drawings showing sectioned views of the action of the G36 rifle. As can be seen, rather than being the "modern product that opens up new perspectives", the G36 action resembles nothing so much as the action of the ArmaLite AR18, now nearly half-a-century old.

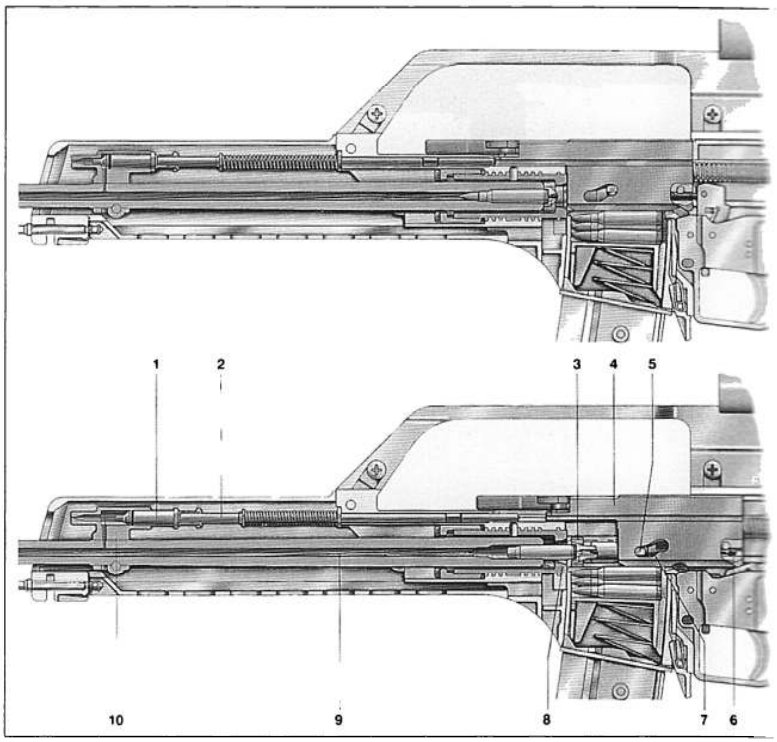
Above: action closed and locked, firing the chambered cartridge.

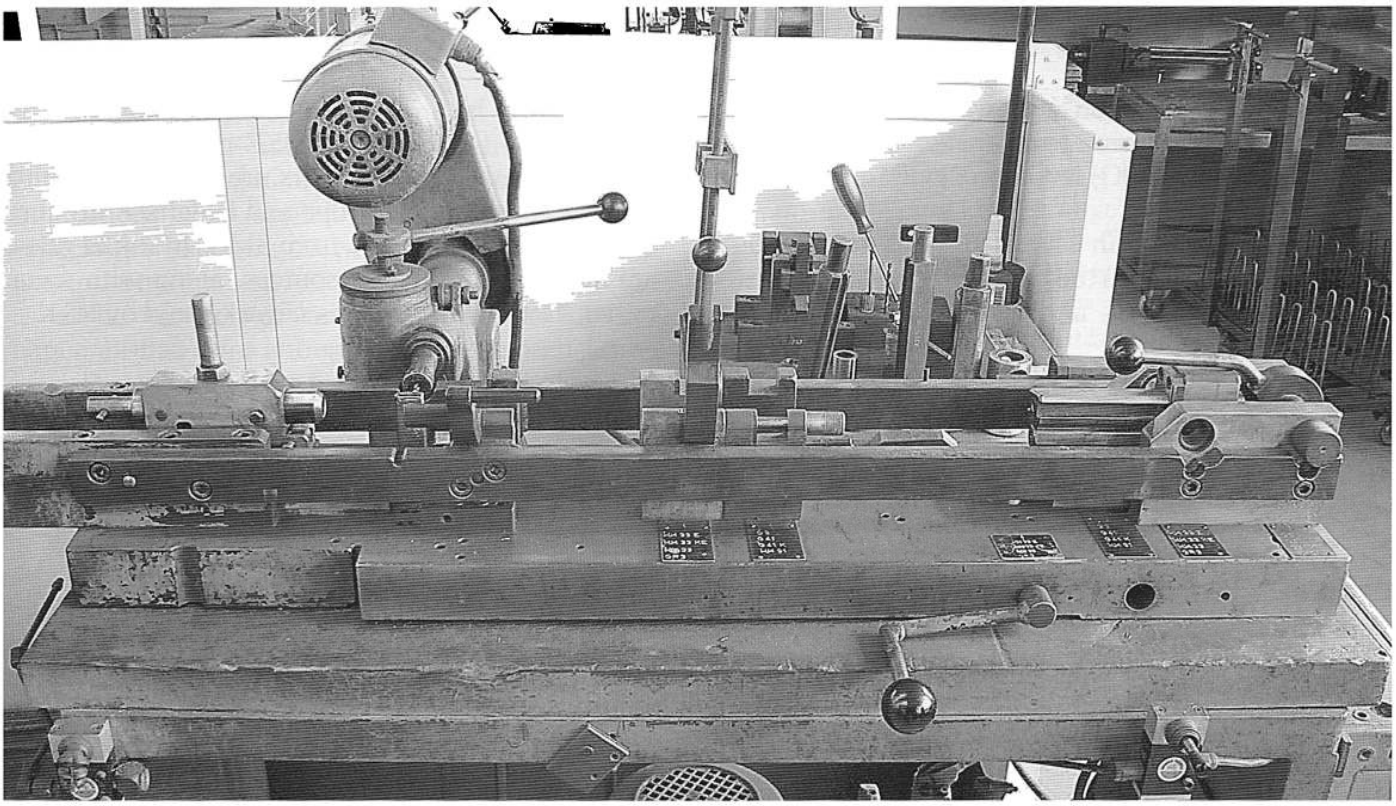
Below: bolt unlocked and action opening after firing, in response to gas impingement.

The numbered components are identified as follows:

1. gas piston
2. push rod
3. bolt head
4. bolt carrier
5. cam pin
6. firing pin
7. cam slot in carrier
8. barrel extension
9. barrel
10. gas cylinder.

courtesy H&K GmbH





652. A time-honoured machine languishes in a neglected corner of the factory floor in the H&K production facility in Oberndorf. This is where barrels were pressed into the receivers of H&K G3s and other models of the HK "family" of roller-locked arms.

Note the small metal guide plates riveted onto the base, which indicate the precise positioning of the receiver for each model. courtesy H&K GmbH, photo by the author

issued to the élite Crisis Reaction Forces in September, 1996, and the 50,000th G36 came off the line in Oberndorf in July, 1998.

The G36 was described in a brochure produced by Heckler & Koch Defense of Sterling, Virginia as follows:

The HK G36 Weapon System

Developed by HK in the mid-1990s, the G36 is a true modular weapon system in caliber 5.56x45mm NATO (.223 Remington). Constructed almost entirely of a tough, carbon fiber reinforced polymer material and using a simple, clean-shooting, self-regulating operating rod gas system, the G36 provides the user with a lightweight weapon that delivers high performance with extremely low maintenance. The barrel of the G36 can be exchanged by unit armorers to create a rifle, compact carbine, or light support variant using the same common receiver . .

Introducing the Aftermarket

Ironically, with the entire roller-locked "family" (except for the MP5) having long since vanished from the H&K catalogue, a burgeoning "Aftermarket" in HK copies and clones, including some wildly inventive versions never imagined by H&K, continues to proliferate on both sides of the Atlantic with no let-up in sight.

A brief selection of some of the more interesting of these products follows.

Copies and Clones in Europe

Compared with the stringent policies of the BATFE (the Bureau of Alcohol, Tobacco, Firearms and Explosives, now an agency of the US Treasury Department) which prohibit the importation of major components such as barrels and receivers into the USA, in most of Europe there are generally fewer restric-

tions on the importation of newly-made arms and major components from one or other of the firms such as Hellenic Arms (EBO) in Greece, POF in Pakistan, and MKE in Turkey.

In fact, as noted in Chapter Twenty-four, MKE is already cashing in on the popularity of H&K clones with a lineup of full- and semi-automatic roller-locked arms in a variety of configurations, barrel lengths and finishes, and MKE component parts. including barrels and receivers, are available to "third party" assemblers in Europe and Britain. A number of copies of H&K designs, from SMGs to sniper rifles. are available from such sources, along with some rather startling innovations never offered by H&K.

The FR Ordnance MC-51

653. Left side view of the 7.62mm NATO calibre MC-51 ultra-short assault rifle, marketed briefly during the late 1980s by FR Ordnance International Ltd of the UK.

As described in the text, below, the MC-51 "is slightly longer than the Heckler & Koch 9mm MP5A3 and weighs about 1.2kg [2.65 lbs] more than that weapon."

courtesy Mick Ranger

One of the earliest examples of the audacious trend toward thinking "outside the box" is the now-discontinued 7.62mm NATO calibre MC-51. A selective-fire "short assault rifle" marketed briefly during the late 1980s by FR Ordnance International Ltd of Frog's Hall, Hertfordshire, the MC-51 was described as follows in a brief excerpt from a recent issue of *Jane's Infantry Weapons*:

> *. . The FR Ordnance 7.62mm MC-51 is marketed as a submachine gun but it fires the 7.62x51mm NATO rifle cartridge. It . . is slightly longer than the Heckler & Koch 9mm MP5A3 and weighs about 1.2kg [2.65 lbs] more than that weapon. The combination of short weapon and powerful cartridge produces ballistics sufficient to defeat any type of body armour and even 13mm steel plate can be penetrated using AP bullets . .*

The angle of contact with the locking rollers on the *Steuerstück* was modified slightly in order to

654. Left side closeup of MC-51 serial no 1131, showing markings.

As noted in the text, "Only about 50 MC-51s were ever made (all about 18 years ago), and these were all manufactured by hand by converting new G3A4s."

courtesy Mick Ranger

compensate for the reduced duration of maximum pressure brought about by the extremely short (230mm; 9") barrel. Other than that, no other major innovations were applied, and the muzzle blast, especially when firing the MC51 fully-automatically, was quite spectacular.

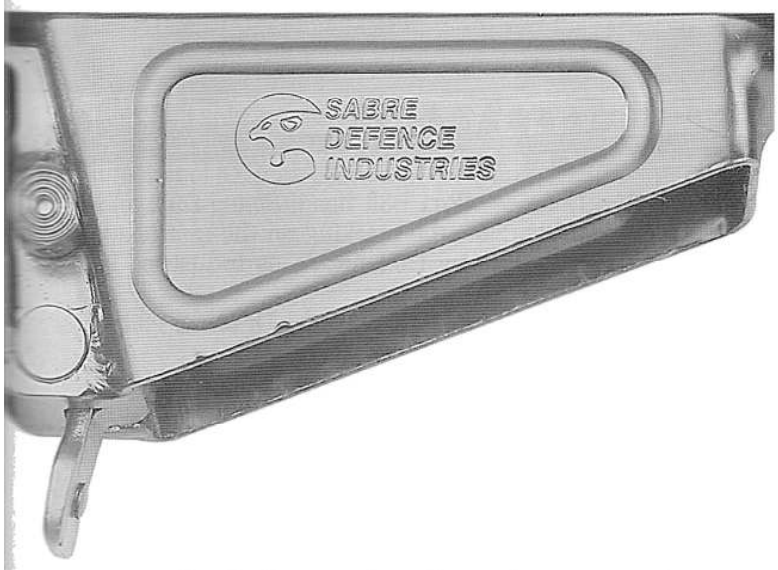
The erstwhile president and owner of FR Ordnance, British arms entrepreneur and manufacturer Mick Ranger, added the following in correspondence with the author:

> *. . FR Ordnance no longer exists, and any enquiries are now handled by Imperial Defence Services Ltd.*
>
> *Only about 50 MC-51s were ever made (all about 18 years ago), and these were all manufactured by hand by converting new G3A4s. We were always hoping to get a large order (say 500+) to warrant investing in some CNC equipment to do the work needed and therefore bring costs down per gun.*
>
> *Unfortunately, I think it is unlikely now that any more will ever be made—the world is changing to more lightweight, plastic-based weapons like the G36, AUG, P90, etc—and the MC-51 is now somewhat of a dinosaur . .*

The Sabre Defence Industries Ltd XR41

655. Right side view of a Sabre Defence XR41, as displayed at this year's IWA arms fair in Nuremberg.

The rubber cheekrest on the retractable stock is for display only, as with it in place the stock cannot be retracted. photo by Richard Jones



656. Left side closeup of a Sabre Defence XR41, showing markings.

Note the oversize steel pin and "paddle" magazine catch. courtesy DWJ, photo by Dr Elmar Heinz

657. Right side view of Sabre Defence XR41 serial no 0199, showing markings.

courtesy DWJ, photo by Dr Elmar Heinz

658. Right side closeup of a Sabre Defence XR41 with handguard removed to show the configuration of the conventionally rifled heavy barrel, which is 20mm in diameter. courtesy DWJ, photo by Dr Elmar Heinz

659. Left side view of the pistol grip assembly (lower receiver) of a Sabre Defence XR41.

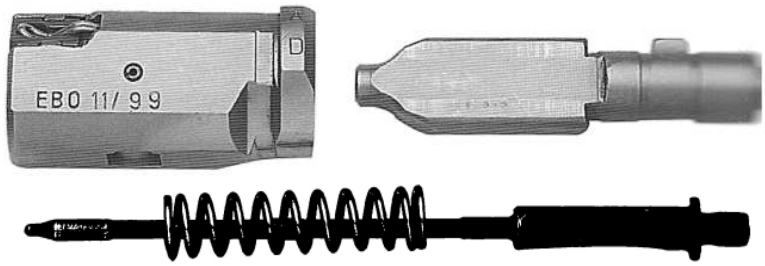
Note the absence of a front locking pin hole and the two selector positions, Safe and Fire.

courtesy DWJ, photo by Dr Elmar Heinz

660. Left side closeup of the Sabre Defence XR41 bolt carrier, showing markings indicating manufacture by Hellenic Arms Industries of Athens in March, 1996.

This is a common practice in Aftermarket rifles produced in Europe, where there are fewer restrictions against using major components manufactured in countries such as Pakistan, Greece and Turkey.

courtesy DWJ, photo by Dr Elmar Heinz



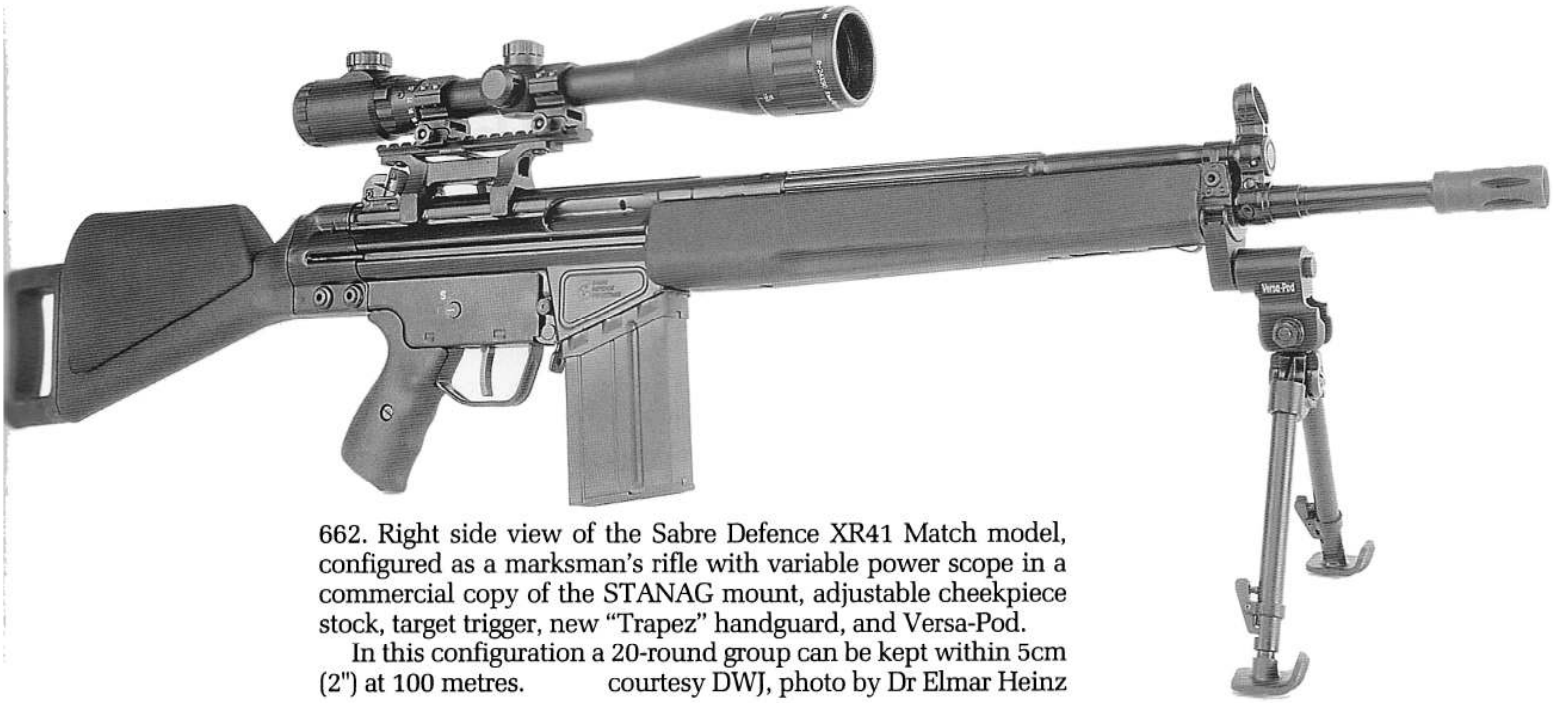
661. A Sabre Defence XR41 bolt head, *Steuerstück* and firing pin assembly. Note the marking on the bolt head indicating manufacture by Hellenic Arms Industries in November, 1999.

courtesy DWJ, photo by Dr Elmar Heinz

Sabre Defence Industries Ltd of Sabre House, Northolt, has been manufacturing M16s to the available TDP (Technical Data Package) in the UK for the past fifteen years. Recently they have developed a series of semi-automatic self-loading rifles based on the H&K roller lock action for commercial sale within Europe. The HK91 was banned in Europe but the HK41 was not, so Sabre Defence copied the latter name and their rifle became the XR41.

Basically, the XR41 is a semi-automatic G3, made with good-quality components including a steel lower receiver mated to a traditionally stamped upper receiver with an oversized pin welded in place to preclude attaching a selective-fire lower receiver. In addition a restrictor plate is welded in through the auto sear trip channel of the upper receiver, so only a semi-auto bolt carrier can be inserted.

The XR41 is completely compatible with G3- and HK91-series optional accessories such as the adjustable target stock and STANAG optic sight mount. Only the handguard has to be altered to accept the contour of the heavy barrel.



662. Right side view of the Sabre Defence XR41 Match model, configured as a marksman's rifle with variable power scope in a commercial copy of the STANAG mount, adjustable cheekpiece stock, target trigger, new "Trapez" handguard, and Versa-Pod.
In this configuration a 20-round group can be kept within 5cm (2") at 100 metres. courtesy DWJ, photo by Dr Elmar Heinz

The Waffen-Schumacher HSG

663. Left side view of a pair of HSG Match rifles, produced by the arms manufacturers and dealers Waffen Schumacher of Krefeld, Germany, in a photo taken at this year's IWA arms fair in Nuremberg. The HSG is a copy of the H&K PSG marksman's rifle, with major components sourced from POF in Pakistan. photo by Richard Jones

664 (right). Left side closeup of the HSG Match rifle above, serial no 05004, showing markings.
photo by Richard Jones

Copies and Clones in the USA

As far as the US market is concerned, most of the arms being sold utilise ex-military CETME and G3 rifles, purchased abroad and stripped down to salvage as many original components as can legally be imported. These parts are then assembled into new arms, based on receivers and barrels newly-manufactured in the USA.

Barrels in standard military calibres are commercially available, but barrels with fluted chambers are only produced by a relatively few manufacturers, and they are not cheap—in fact it has been said that adding the flutes costs nearly as much as the price of the barrel itself.

The story is considerably more interesting in regard to the new receivers. Several different approaches have been taken by various manufacturers in their quest for cost-effectiveness, and a few of these are discussed below.

Century Arms, Inc

CETME and HK91 Clones on Four(!) Different Receivers - Two Stamped and Two Cast

665. Right side view of a CETME "clone" produced by Century Arms Inc of Georgia, Vermont.

The rifles are sourced overseas as used military surplus, and the parts are imported and re-assembled on newly-manufactured barrelled receivers.

The device permanently attached to the muzzle of the barrel is a "compensator"—NOT a "muzzle brake"—which reduces perceived recoil but produces a much louder report. courtesy Century Arms Inc

666. Right side view of the stamped receiver produced by Century Arms for use on its CETME clones. Markings read "CETME SPORTER .308 CAL./CENTURY ARMS INC./GEORGIA, VT/MADE IN USA".

Note the housing for the four-way CETME rear sight (fig 606). courtesy Century Arms Inc

667. Right side view of the Century Arms investment-cast CETME receiver, bearing markings indicating Century's old St Albans, Vermont address.
courtesy Century Arms Inc

668. Right side closeup of the above receiver, showing markings including Century's old St Albans, Vermont address.

Note the stiffening ribs are an integral part of the receiver casting. courtesy Century Arms Inc

669. Right side closeup of a later investment cast CETME receiver, showing markings including Century's new Georgia, Vermont address. courtesy Century Arms Inc

Century Arms Inc, a large US arms importer and manufacturer based in Vermont, began assembling parts taken from ex-military CETME and G3 rifles in 1998. They relocated their factory from St Albans to Georgia, Vermont in 2000, and while they continue to source their barrels from various US commercial manufacturers, the firm actually manufactures four basic receivers—two stamped and two investment cast—and offers both CETME and HK91 clones built on the purchaser's choice of either type of receiver. There are minor differences between the CETME and G3 receivers, mainly in the rear sight and the way in which the buttstock ferrule attaches.

The investment cast receivers are made on tooling purchased in 1999 from its originators, Special Weapons LLC of Phoenix, Arizona. G3-type receivers made by Special Weapons required considerable hand-fitting, and Century reworked the tooling to be much more user-friendly, and then produced their own moulds to make the CETME receiver.

Casting a complex part as long and thin as the receiver Century wanted was seen as highly problematic by several specialists in this field, but these misgivings were soon overcome and Century currently has its castings vaccuum-formed and heat-straightened by a high-tech aerospace firm.

The finished receivers have no provision for a forward mounting pin, as this feature is considered unacceptable by the US BATFE.

670. Right side view of an HK91 clone produced on the investment cast G3 receiver by Century Arms Inc.
Note the plastic furniture, diopter rear sight and aluminum magazine. courtesy Century Arms Inc

The "Crucial Twenty Parts"

The BATFE supplies manufacturers of semi-automatic versions of self-loading military-type rifles with a list of twenty component parts. The stipulation is that not more than ten of these components may be of foreign manufacture, although these ten parts can be in any combination in a given rifle model. The list is as follows:

- receiver
- barrel
- muzzle attachment
- barrel extension
- mounting block or trunnion
- operating rod
- gas piston
- bolt
- bolt carrier
- hammer
- trigger
- disconnector
- sear
- pistol grip
- forend
- handguard
- magazine body
- magazine floorplate
- magazine follower
- buttstock

The presence of the first two items on the list, the receiver and the barrel, is rather redundant, as the importation of either of these items is prohibited.

PTR91 Inc (formerly JLD Enterprises, Inc)

The PTR91: a Different Approach to an "Original" Receiver

PTR91 Inc, formerly JLD Enterprises, Inc, of Unionville, Connecticut, also produce an HK91 clone called, eponymously, the PTR91, which is also assembled from ex-military G3 components and newly-manufactured receivers and barrels.

The barrels, with fluted chambers, are sourced in the USA with rifling to the same specifications as used in the originals. As for the receivers, this firm has taken an audaciously different approach. As discussed in Chapter Twenty-four, the Portuguese arsenal Fàbrica Militar de Prata (FMP) was licensed by the German BWB to manufacture the H&K G3 for Portuguese forces in 1961. When Portugal's G3 programme was completed, the factory lay idle for a number of years until the owners of the then-named JLD Inc purchased the contents and brought all the machinery and tooling back to their facility in Connecticut. Thus today, the PTR91 HK91 clones are produced on receivers made exactly the same way, and on the very same H&K-supplied machinery, as the Portuguese, taught by H&K engineers, used to make the receivers for their G3s.

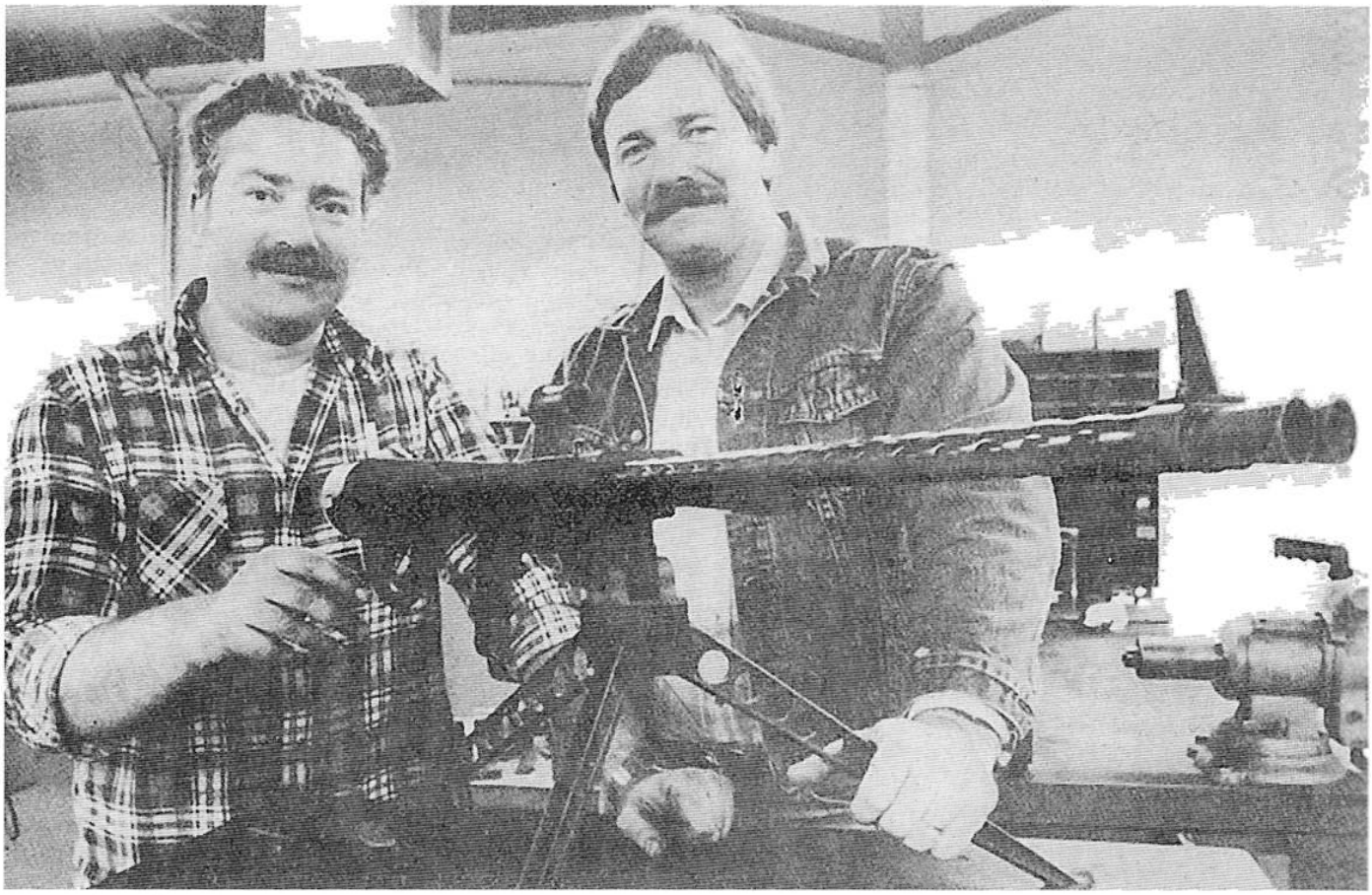
PTR receivers, marked with the company's scorpion logo, feature in the series of complete arms offered by PTR91, as well as forming the basis for the products of a number of other manufacturers who assemble their own versions on PTR91-manufactured receivers.

671. A promotional photo from PTR91 Inc of Unionville, Connecticut, showing a montage of two of their HK91 clones dressed up with various optional accessories.

Note the extensive use of Picatinny-type rails, which accept a variety of optic sights, laser aiming devices, front grips and bipods, and the suppressor on the fixed-stock rifle in the background (above). courtesy PTR91 Inc

A California Take on the Roller Lock, from Calico Light Weapons Systems

An Initial Eyecatcher: the Calico "Two-Twenty-Two"



672. A photo from the Bakersfield *Californian* shows company president Mike Miller, left, and his then-partner Warren Stockton, demonstrating the Calico "Two-Twenty-Two", which converted two Ruger 10-22 semi-automatic rifles (less stocks) into a crank-operated dual-barrel device capable of a theoretical firing rate of about 500 rpm.
courtesy Mike Miller

In the late 1980s Mike Miller, president of the California Instrument Company, a manufacturer of specialised precision instruments for the petroleum industry located in a warehouse in Bakersfield, California, decided to branch out into the gun business.

The first product designed by Miller and his then partner, Warren Stockton, was called the "Two-Twenty-Two". This was a kit which converted two standard Ruger 10-22 semi-automatic .22LR calibre sporting rifles into a single dual-barrel device reminiscent of the "twin 50s" of World War II. The kit contained a tripod and base unit with a centrally mounted rear sight. The barrelled receivers of both Ruger rifles, with their stocks removed, were slid into the impressively ventilated barrel jackets of the device, which came complete with flash hiders and a single front sight.

Fed from two standard 10-shot Ruger rotary magazines, the device was fired by pulling the trigger while turning a crank to produce a theoretical rate of fire—strictly semi-automatically—of about 500 rpm.

The Calico "Two-Twenty-Two" proved a novel and instant success, prompting the company to increase the number of its employees from four to 22 to keep up with orders.

Mike Miller summed up the rationale behind the device in an article in the Bakersfield *Californian* by saying "It's not a weapon, it's for shooting enjoyment . . It can't be hand-carried and fired, and it can't be concealed."

Calico 9mm Roller-Locked Pistols and Carbines

673. Left side view of an early non-firing mockup of the roller-locked M-950 pistol, fitted with the company's proprietary 100-round helical-feed magazine.
courtesy Mike Miller

By 1991 the California Instrument Company had changed its name to Calico Light Weapons Systems and was manufacturing several models of blowback .22LR semi-automatics and, of special interest here, a line of futuristic roller-locked 9mm pistols and carbines boasting several truly innovative features. A press release, issued to describe the newly reorganised company, is excerpted as follows:

> ***Calico Light Weapons Systems*** *of Bakersfield, California, has been created from a recent management-led buy-out. This new company manufactures a wide range of .22 calibre and 9mm firearms for the sporting, military, law enforcement and export markets.* ***Calico*** *is headed by Michael K Miller, President, Clifford David, Vice-President Engineering, and Schuyler Graham, Marketing Director for Military, Law Enforcement and Export. In 1990,* ***Calico*** *won a battle with California's Attorney General to protect the company's right to manufacture in that state. The new company has forged innovative engineering developments with dynamic sales programs for 1991. These aggressive moves have spawned new products for the sporting goods market and innovative weapon systems for law enforcement and military activities world-wide . .*

Excerpts from an article in the Sunday edition of the Bakersfield *Californian* of August 11, 1991 further sum up the firm's progress to that date as follows:

Firm going great guns with sales: Armsmaker lures worldwide interest

> *In a nondescript building on East 19th Street, more than 20 people work diligently to make something that the Israeli government wants. The German secret service is also interested.*
>
> *Inside is Michael Miller. His small office is decorated with autographed photographs of actors Sylvester Stallone and Chuck Connors. On the shelves of his bookcase sit tiny historical models of old cannons. The motif is completed with a display behind Miller's modest desk: 11 of the nastiest-looking pistols and rifles available.*
>
> *Miller is president and part owner of Calico Light Weapons Systems, the only firearms manufacturer in Bakersfield. From his corner office Miller oversees the production and sales of .22-caliber and 9-millimeter assault pistols and rifles—the same kind of guns that whipped up controversy in 1989 when five children were killed in Stockton by a man using an assault rifle.*

Since then, a number of semi-automatic assault weapons, including one made by Calico, have been banned by the state. Miller's company became embroiled in several court proceedings to determine if Calico was allowed to make and sell similar weapons. The courts ruled in favor of Calico.

"We finally got our machine gun licence. We finally got our assault-gun licence. We finally got everything," [Miller] said, relishing his victory over the efforts . . to rid California of all "assault" weapons.

However, Miller and Calico, foreseeing continued trouble with gun-control efforts, are now shifting their sales emphasis to law enforcement and foreign governments.

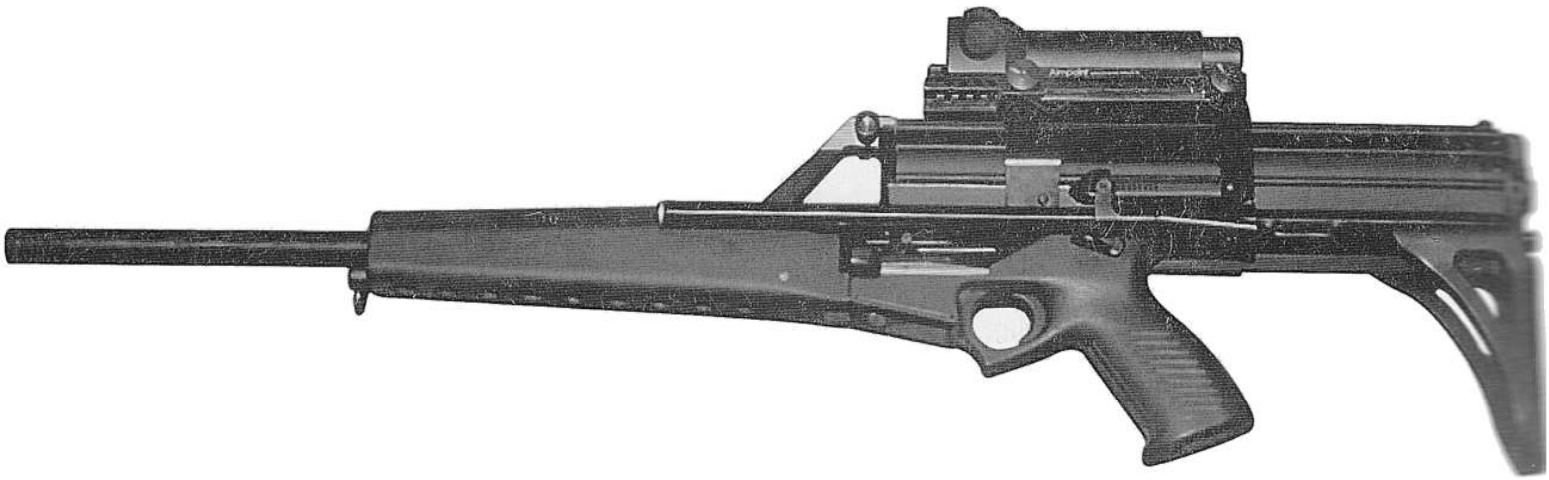
"We just don't know what new laws will come up," said Miller, 47. "We'll keep selling to commercial outlets, but we can't count on that market sustaining our company."

Three .22-caliber and two 9-millimeter firearms manufactured by Calico are available to the public . .

Calico sells automatic and semi-automatic weapons to at least 10 governments and foreign interests. Interest in the company's sleek, innovative firearms has included inquiries from Saudi Arabia, Taiwan and Germany.

As Miller flipped through a collection of letters from foreign interests, he pulled out a company pamphlet from Israel. "Here's a whole brochure printed in Hebrew," he pointed out. He showed further inquiries from London, an organization based in El Salvador, and from numerous US law enforcement agencies. The State Department, which regulates the export of firearms, buys guns from Calico for diplomatic security. "They really like our stuff," he said . .

Describing the Calico M-900 Carbine and M-950 Pistol



674. Left side view of the first production prototype of the Calico M-900 carbine, fitted with a steel buttstock and 100-round helical magazine.

A commercial Aimpoint sighting device is mounted on a bracket which encircles the magazine.

courtesy Mike Miller

The two main Calico 9mm products which were initially available to civilian purchasers, the M-900 carbine and M-950 pistol, were described in a Calico brochure as follows:

The all-new Calico M-950 Pistol and M-900 carbine combine several unique features to create superior handling not found in any other weapon. They both incorporate the Helical Feed system with the option of using a 50- or 100-round magazine. Even with the 100-round capacity they are lighter than an Uzi or H&K [MP5], and retail for substantially less. The Helical Feed magazine can be loaded and stored without spring fatigue, and with the Calico speed loader, the 50-round magazine can be loaded from an open box in less than 15 seconds, 30 seconds for 100 rounds.

Both pistol and carbine have virtually no muzzle climb, even when rapid firing, and eject spent cases straight down, in front of the trigger guard, for close-quarter operation. A fully ambidextrous safety, a static cocking handle with no external

675. Left side view of an early prototype of the Calico M-950 pistol.

A 50-round helical magazine is clipped in place, while the 100-round version appears above.

courtesy Mike Miller

moving parts and a comfortable nylon web sling offer superior handling of the M-950 pistol and M-900 carbine. Both field strip in a few seconds without tools, and feature an easily adjusted front sight for windage and elevation.

The M-950 pistol when fully loaded is comparable in weight to a big-bore pistol, except that the M-950 has 50 rounds of ammunition. The M-900 carbine has a comfortable sliding steel buttstock that locks solidly into position for added accuracy . . .

The bolt is a delayed blowback type similar to H&K's, except ours was designed specifically for 9mm ammunition and is significantly smaller and lighter. [It is] manufactured from high-strength heat-treated 440C stainless steel that easily withstands shock, wear and corrosive fouling. The bolt, striker, springs and buffer drop out of the receiver as a single unit with no loose parts.

As Mike Miller noted in his 1991 interview, reprinted above, the forces of gun control were definitely on the rise, and thus Calico's continued success in the civilian market could not be guaranteed. Nevertheless, some added publicity came their way via another newspaper article in the Bakersfield *Californian* dated June 23, 1992, which told the story of the Texas multi-millionaire Ross Perot purchasing a Calico M-951 deluxe carbine for his personal defence use, specially serially numbered "RP 6-27-30", Perot's initials and date of birth.

Concentrating on Military Sales: the M-955A Selective-fire Carbine and the M-960A Submachine Gun

676. A photo from an advertisement headed "Maximum Firepower, Minimum Exposure", which appeared in *Jane's Infantry Weapons*, showing two selective-fire Calico weapons, the M-960A submachine gun, left, and the M-955A carbine, right. courtesy Mike Miller

By this time, armed with the appropriate licences to manufacture selective-fire weapons, Calico had introduced the M-955A selective-fire carbine and M-960A submachine gun, and then determinedly set out to gain exposure in the defence marketplace. Advertising in such publications as *Jane's Defence Weekly* and making sample weapons available for evaluation by defence experts soon caught the attention of a number of interested officials.

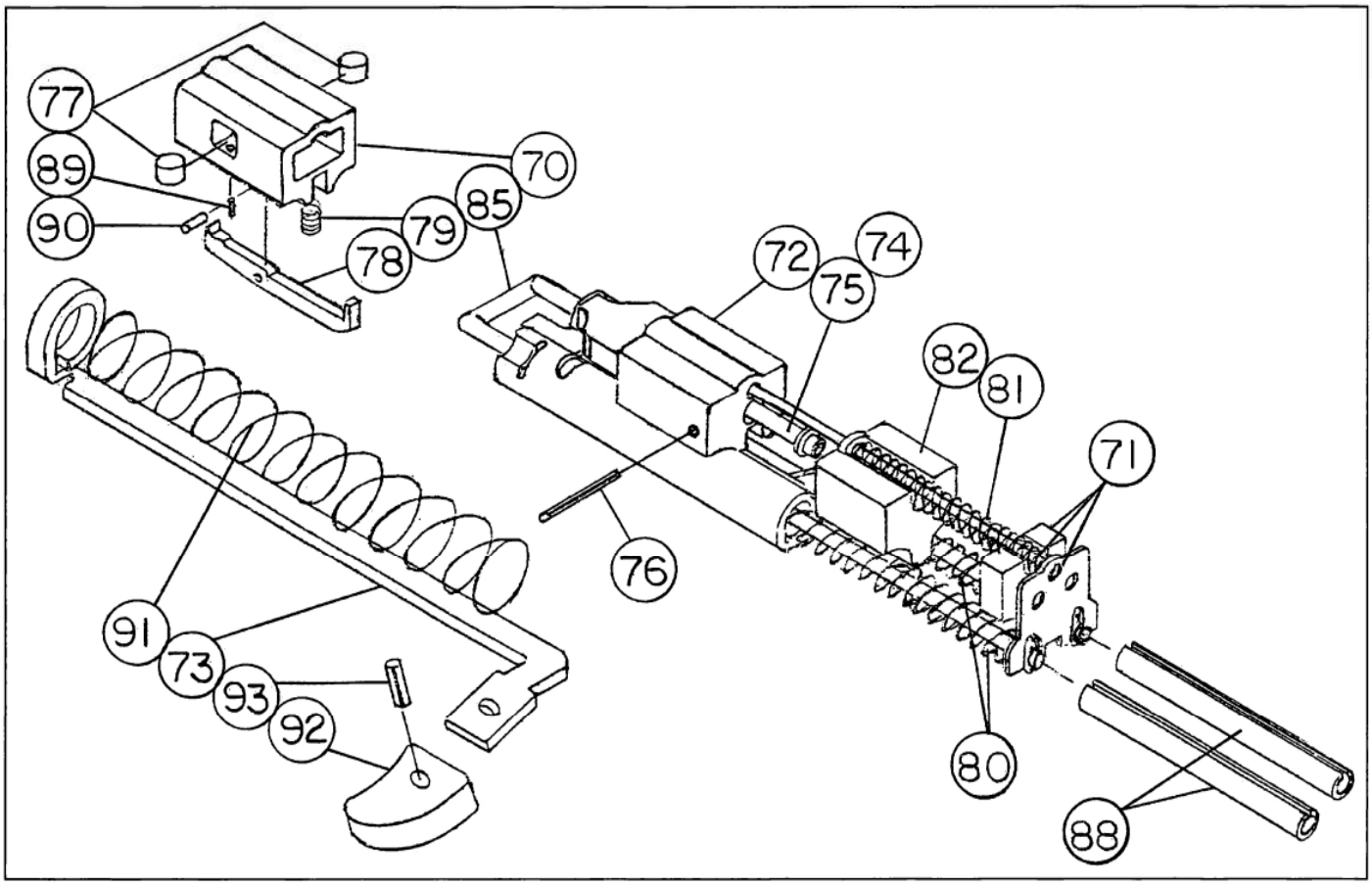
In the August, 1992 issue of *International Defense Review*, the Calico M-960A submachine gun was favourably summed up as follows: "[Calico's] light weight, good balance, useful dispersion, large magazine capacity, and downward ejection make the Calico compare favourably to any submachine gun or Personal Defense Weapon in the world."

Some Calico Innovations

The Roller-Lock Bolt System: No Flutes, and No *Rückprallsperre*

The Calico bolt features a true half-locked roller system, with several unique innovations which reflected favourably on the design and construction of the entire weapon.

After extensive testing, during which over a million rounds of 9mm ammunition were fired, it was concluded that two inherent and expensive features of the H&K roller lock system, the fluted chamber and the *Rückprallsperre* (the anti-bolt-rebound device), were simply not necessary, and so neither was included in the Calico design.



677. A drawing from the Calico handbook on the M-900 and M-950, showing a left rear three-quarter view of the Calico roller-locked bolt assembly, partially disassembled.

The numbered components are identified in the Calico handbook as follows:

70. Bolt, female
71. Buffer assembly
72. Bolt, brazed
73. Bolt handle
74. Firing pin, carbine
75. Firing pin, pistol
76. Pin, stop, firing pin
77. Roller (2)
78. Extractor
79. Spring, extractor
80. Spring, bolt, return (2)
81. Spring, striker
82. Striker
85. Guide rod, return spring
88. Split tube (2)
89. Pin, roller (2)
90. Pin, extractor
91. Spring, handle
92. Knob, charging
93. Pin, charging knob

courtesy Mike Miller

At first it was assumed that the fluted chamber would be needed, and various methods of manufacturing it were considered. Then Miller and his associates decided on a series of test firings without the fluted chamber. Commercially-available cartridge cases of varying hardnesses, foreign as well as domestic ammunition lots, reloads as well as new cartridges of both sporting and military types were used. A 20,000-round series of firing tests were run with two weapons, one short-barrelled and the other with the longer carbine barrel. The guns were fired dry, lubricated, actually submerged under water, and in temperatures from below freezing to +100°F. At the conclusion of the trial no stuck cases had been observed, and there was no apparent damage to the barrels or chambers. The decision was therefore made to leave the chambers unfluted. The same series of tests were performed again when the full-auto versions of the 9mm weapons became available, and there was never a complaint from customers or agencies which tested the weapons about trouble with the unfluted chambers.

The locking shoulders in the receiver are actually pinned-in sections of standard hexagonal stock made from 4130 heat-treatable steel, which permits the receiver itself to be manufactured from cast A-356 aluminum, with a T-6 temper. The 60° angle of the hex inserts was used against the rollers and, after a

lengthy series of tests, during which various bolt weights and spring pressures were experimented with to arrive at a formula which produced dependable results with various bullet weights and powder charges, the angle of the bolt around the firing pin against the inside of the rollers was set at 15°. These parameters, combined with the final design of bolt return spring, performed well under every test condition imaginable, including firing 100 rounds while the gun was fully immersed in a mud bath, which Mike Miller notes in correspondence with the author was "very messy".

678 (right). Right front three-quarter view of the diminutive Calico roller-locked bolt assembly.
Note the US quarter, included to indicate the scale.
courtesy Mike Miller

The Top-Mounted Helical-Feed Magazine

A key element of the excellent balance and control features of the Calico design was the top-mounted helical feed system, designed by Calico president Michael K Miller and his initial partner, Warren D Stockton.

The Calico helical clamshell magazine, manufactured largely from glass-filled black polymer, was the subject of at least three US patents: no 4,676,137, granted on June 30, 1987; no 4,738,183, granted on April 19, 1988; and 4,766,800, granted on August 30, 1988. All featured both Miller and Stockton as co-inventors. The commercial Calico brochure described the advantages of the 100-round version of this innovative design as follows:

> *The patented M-900 and M-950 one hundred round magazine is the new high-water mark in firearm development. The one hundred 9mm cartridges are stacked in two helical layers around the inside of a magazine that takes up less space than the empty ammo boxes. The cartridges roll on each other like ball bearings to minimize friction. The drive spring is less than half an inch in diameter, so there's no wasted space.*

679. A right front three-quarter view of the central feed rotor, the "heart" of the ingenious Calico helical magazine, showing the way in which the 9mm cartridges are stacked in two helical layers. As noted in the text, "the cartridges roll on each other like ball bearings to minimize friction."
courtesy Mike Miller

The Calico Speed Loader

Designed by Mike Miller in 1988, the 9mm speed loader was designed to accept both the 50- and 100-round helical magazines. The Calico brochure described this useful accessory as follows:

[The 9mm speed loader] takes just 15 seconds to fully load from an open ammo box to magazine, 30 seconds for the 100-round magazine. Just lay the rounds on the clear plastic tray, remove the styrofoam or plastic carrier, snap the arms closed, insert the magazine and crank 'em in.

Mike Miller told the author in a telephone interview that the elapsed time for loading and firing 100 rounds, from opening two 50-round boxes, loading the magazine, firing all 100 rounds downrange with all the brass being collected in the optional accessory snap-on Cordura brass catcher, was between 30 and 40 seconds.

The Rate-of-Fire Slowdown Device in the Full-Auto Models

When they were initially developed the fully-automatic models fired far too quickly—around 2,000 rpm—which indicated that some sort of slowdown device had to be developed which would produce a manageable rate of fire of between 650 and 900 rpm.

After some tests a hydraulic damper was chosen which featured a piston fitted in a cylinder, with seals good to three atmospheres (100' under water). A hook on the back of the bolt slipped over the cylinder on the recoil stroke and caught it during its return to battery. This slowed the forward motion for a 3° arc while fluid moved through a small hole in the piston. The cylinder contained an accumulator to overcome the difference in volume caused by the piston rod in the upper chamber.

The entire assembly was fabricated to very close tolerances from heat-treated 174PH stainless steel and the fluid used was very expensive, because it had to retain the same viscosity in temperatures from below freezing to over 100°F.

Calico created a test chamber with air pressure over water (both salt and fresh) to replicate the specified test pressure of three atmospheres. Interestingly, when testing arms fitted with the slowdown device under water at various simulated depths, it was noted that some of the military cartridges failed because water had seeped in and entered the powder chamber. Calico was told that the US Navy SEALs waterproof their cartridges by painting them with clear nail polish, and this worked well.

The Blow Finally Falls

In the words of one of Calico's 50 disaffected employees, the forces of "the media, Democrats and President Clinton" finally triumphed with the passing of a $30 billion crime bill in August, 1994, which outlawed six of the 14 models Calico was then manufacturing, and saw the other eight restricted to law enforcement sale only. Calico President Mike Miller summed up the situation in another newspaper interview by stating that 75 to 80 percent of the business done with sporting goods stores was eliminated by the bill, which "essentially took Calico out of the gun manufacturing business for recreational purposes."

The article continued as follows:

. . The federal government will suffer in the long run, Miller said, because gun manufacturers pay $750 million in excise taxes and employ 100,000 people. Federal Department of Justice reports released in March [1994] show less than 1 percent of homicides in the United States were committed with assault weapons. . .

The company earns between $250,000 and $300,000 per month with sales of between 800 and 1,000 firearms . .

This was actually only one of several crippling blows to the US commercial armsmaking industry, which for Calico culminated in Federal laws restricting the magazine capacity of all new rifles to ten rounds. With their vaunted high-capacity helical magazine thus rendered redundant, Calico was forced to give up the gun business entirely and the company closed its doors in 1995.

Mike Miller summed up some of the high points in his company's history by recalling the adoption of Calico weapons by the Taiwanese Airborne Special Services, after extensive testing against their own

680. A September, 1993 newsmedia photo of Russian president Boris Yeltsin holding an M-950 Calico pistol.

Obviously taken at a Russian military base, the photo came as a complete surprise to Calico president Mike Miller, who could recall no sale that might have resulted in this gun ending up in Yeltsin's hands.

However, Kalashnikov's son later incorporated a knock-off of the Calico helical magazine, mounted under the barrel, in the *Bizon* submachine gun.

courtesy Mike Miller

weapons. The US DOD, DEA and SEALs purchased small numbers for evaluation, and Calico semi- and full-auto weapons were bought by many US police and sheriff's departments.

Approximately 200,000 Calico firearms of all types, both .22 calibre and 9mm, were manufactured and sold during the lifetime of the company.

Chapter Thirty

Accessories and Ancillaries

The Accessory Package

Sling, Cleaning Kits, Belt Pouches, and Muzzle Cover

682. German soldiers on a winter exercise. The man at left is cleaning his P1 pistol, while the man at right is grasping the chain-link pullthrough inside the receiver of his stripped G3 rifle.

Note the G3 pistol grip assembly, takedown pins, magazine and wood handguard with metal caps laid on the field jacket, below the frame of the P1 pistol.

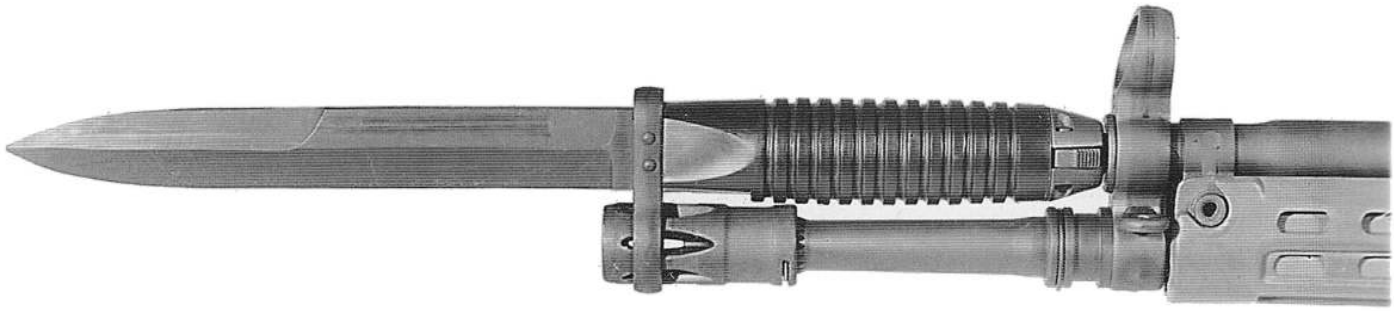
681 (left). Standard G3 accessories in German service.

From top: sling; *Mündungskappe* (muzzle cover); cleaning kit (closed) for .22 calibre weapons; cleaning kit (open) for weapons from 7.62mm to 9mm; magazine pouch holding two 20-round magazines. courtesy H&K GmbH

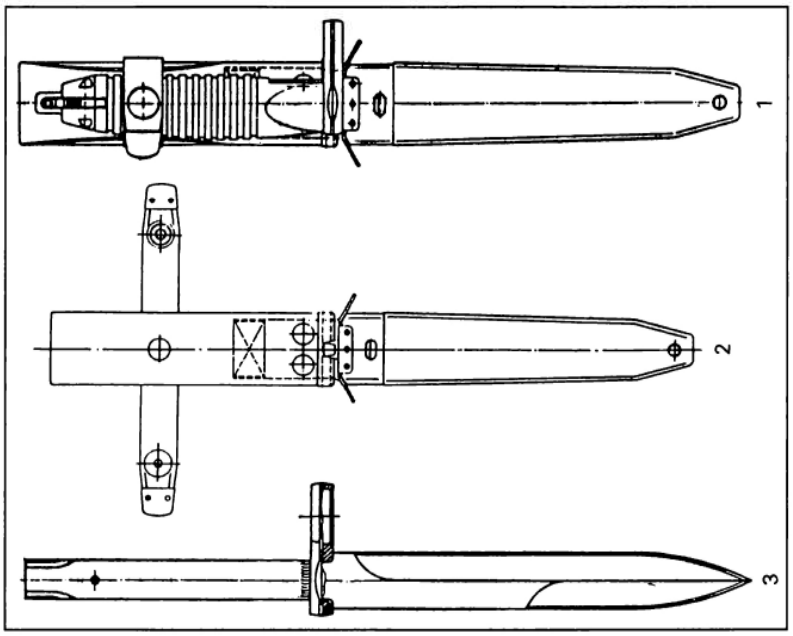
Standard issue accessories for the G3 rifle in German service included a leather sling; a rubber *Mündungskappe* (muzzle cover); a compact cleaning kit in a plastic container fitted to hold a time-honoured chain-type pullthrough, oil bottle, patches, and two brushes dimensioned for weapons with bore diameters from 7.62mm to 9mm. A similar cleaning kit was available for 5.56mm (.22 calibre) rifles, containing smaller brushes and a smaller diameter chain-type pullthrough.

Two types of belt pouches were issued for G3 use in the *Bundeswehr*. One was made of a plastic-rubber mixture, coloured grass green with a rough surface. The other was made of a waterproof plastic-treated fabric with a more or less smooth surface. coloured dark green. Both types held two 20-round magazines.

Bayonets and the Bayonet Adapter



683. Left side closeup of a G3A3 rifle with bayonet attached. courtesy H&K GmbH



684. Illustration from the H&K Export parts catalogue showing three numbered items which could be ordered separately. These are described in fig 685.
courtesy Wolfhart Fritze

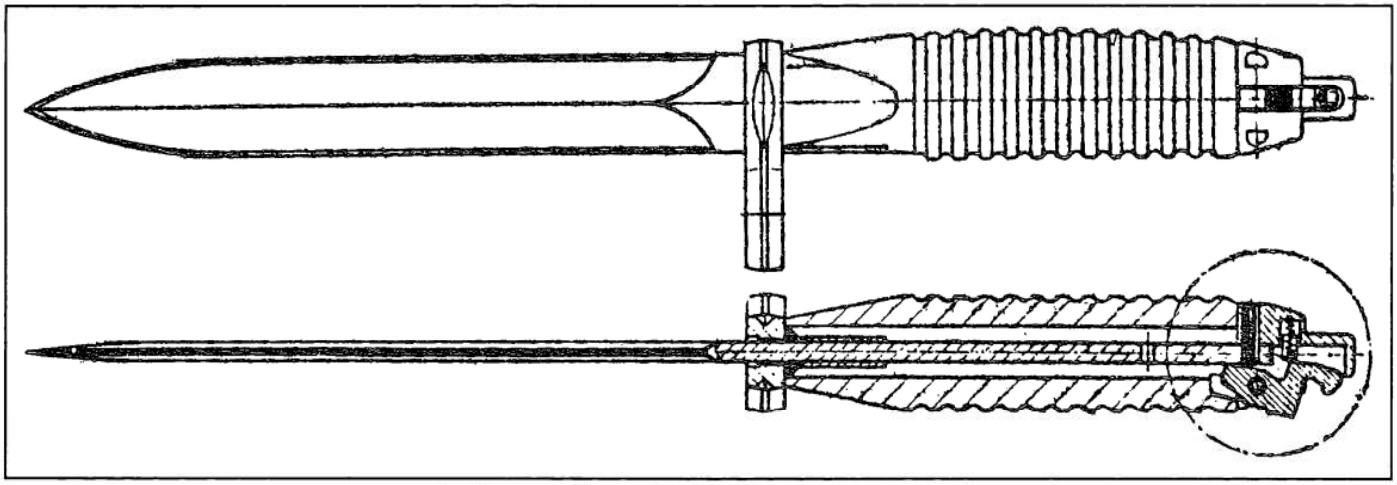
HECKLER & KOCH GMBH OBERNDORF/NECKAR — Rifle G3 Export

Item	Parts Designation	Part No.
1	2	3
1	Bayonet compl. with scabbard	2283
2	Scabbard, bayonet	2283–20C
3	Blade, bayonet compl.	2283–02

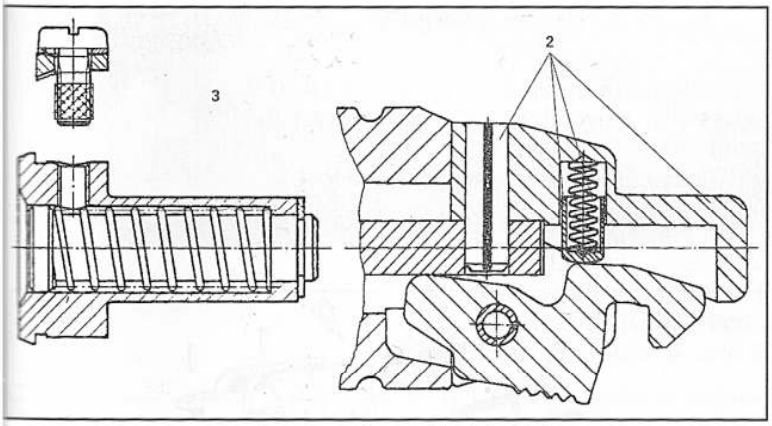
685. Listing from the H&K Export parts catalogue giving particulars and part numbers for the three numbered items shown in fig 684. courtesy Wolfhart Fritze

The *Bundeswehr* did not issue or use bayonets with the G3 rifle, but a number of client countries did, and a variety of G3 bayonets was therefore manufactured over the years by various contractors in Germany and abroad, including H&K.

The standard method of fitting all types of G3 bayonets consisted of mounting the bayonet above the bore directly ahead of the front sight by means of a special adaptor which replaced the end cap on the cocking handle tube. This assembly, made of steel. was affixed to the tube with a screw and lock washer and contained a spring-loaded plunger which was pushed back until the catch on the base of the bayonet handle entered and snapped behind the rim of the receptacle. Removal was effected by squeezing the outer serrated portion of the catch in to release the catch from the rim of the receptacle.



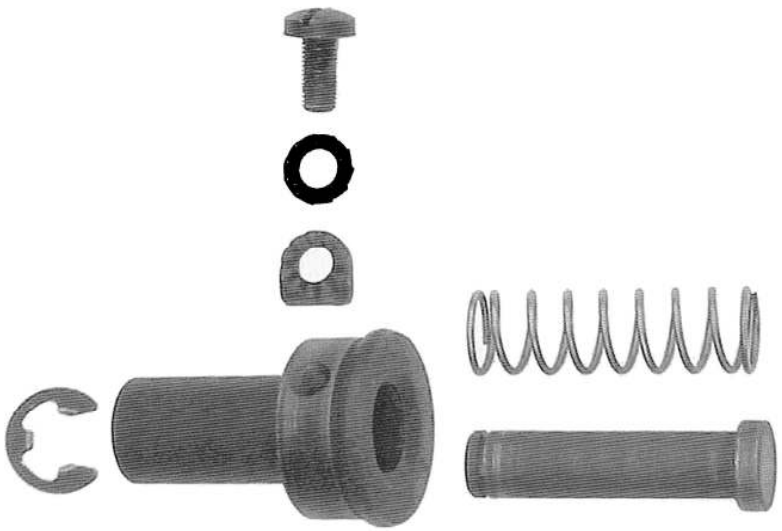
686. A diagram from the H&K Export parts catalogue breaking down the separate bayonet components even further, in case foreign militaries needed to order specific replacement parts. The grip (originally shown as item 1 in this list) is described with its part number in fig 688.
courtesy Wolfhart Fritze



687. Closeup drawings from the H&K Export parts catalogue of the bayonet mount which replaces the end cap on the rifle cocking handle tube (no 3, left), and the set of parts for the bayonet catch (no 2, right). All are listed with part numbers in fig 688. courtesy Wolfhart Fritze

HECKLER & KOCH GMBH OBERNDORF/NECKAR	Rifle G3 Export	Grip, Bayonet compl.
Item	Parts Designation	Part No.
1	2	3
1	Grip, Bayonet compl.	2286–01.05
2	Set parts bayonet	St 2283/300
3	Mount, bayonet	100313

688. Listing from the H&K Export parts catalogue giving particulars and part numbers for the bayonet grip (fig 686) and the two numbered items shown in fig 687.
courtesy Wolfhart Fritze



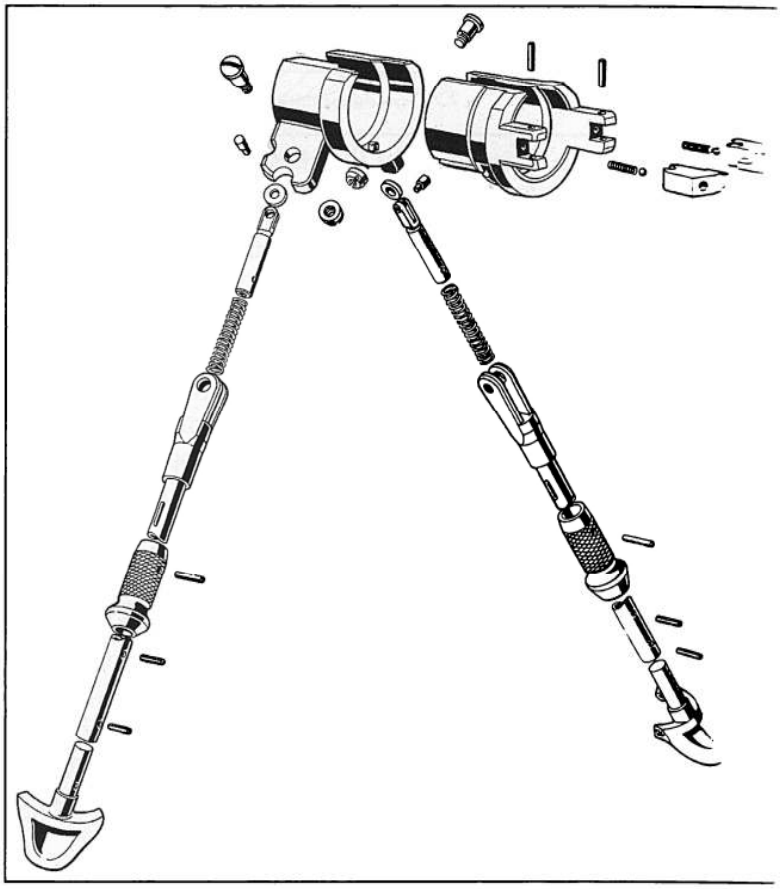
689 (right). The bayonet mount (item 3, fig 687), disassembled.

The spring-loaded bayonet locking plunger (right) is retained by the circlip (left), and the screw and serrated washers above secure the unit in the cocking handle tube to ensure that it does not shoot loose when installed.
courtesy H&K GmbH

The Accessory "Light Bipod"

690. Right side closeup of an HK41, marked HK41-10 B 501, manufactured in November, 1965, fitted with the accessory "light bipod".
The method of attachment is described in the text.
courtesy H&K GmbH

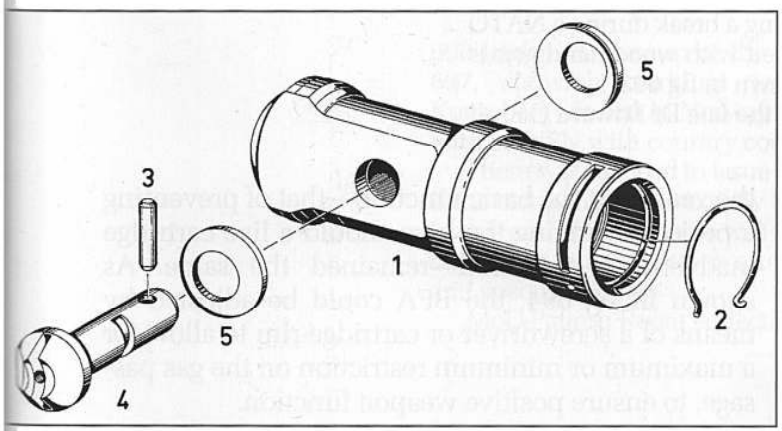
A number of the illustrations throughout this book show rifles fitted with the auxiliary or accessory "light bipod" assembly, which was designed by H&K. This consisted of a semi-circular base unit to which the bipod assembly itself was articulated. To mount the device, the base unit was slid over the front of the rifle and onto the receiver until the spring-loaded catches at the rear locked into the front of the bolt guide ribs pressed into the receiver. The non-adjustable bipod legs (on the standard rifle version) were spring-loaded, and could be folded up against the handguard or lowered to support the rifle.



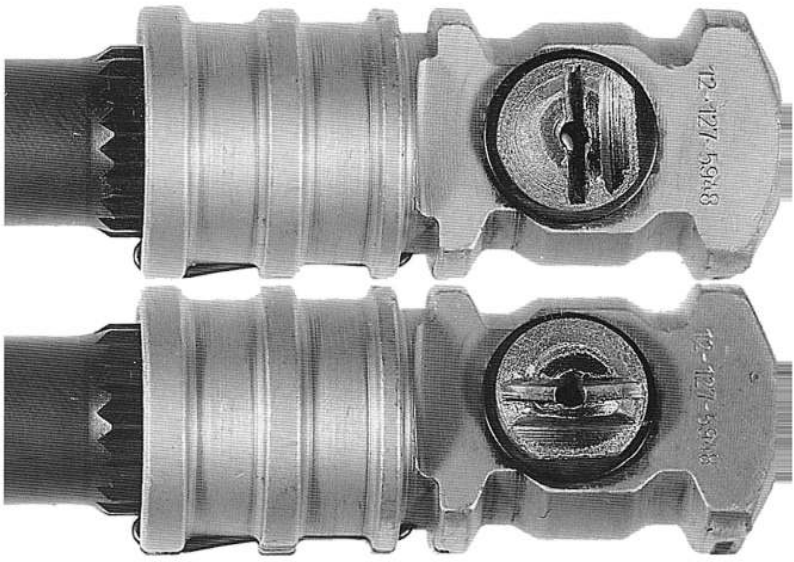
691 (right). An H&K illustration showing an exploded view of the accessory "light bipod".
The base unit, which is attached to the rifle first, is shown at top right. courtesy H&K GmbH

Blank Firing Adapters

692. A German soldier on exercises. His G3 rifle, with wood handguard, is fitted with the version of the blank firing adapter (BFA) shown in fig 693.



693. An exploded view of one style of BFA to be adopted, as shown in fig 692.
Note the unribbed section at rear, and the circular keeper spring (part no 2). The head of the gas adjustment screw (part no 4) is configured to accept the rim of a cartridge. courtesy Walter Schmid



694. Two top views of another style of adopted BFA, installed on a G3 rifle. Note the ribbed section at rear, and the horizontal keeper spring.
Above: set for minimum gas.
Below: set for maximum gas.
courtesy Walter Schmid

695. Two German soldiers taking a break during a NATO exercise. Both G3 rifles are fitted with wood handguards and the version of the BFA shown in fig 693.
courtesy the late Dr Edward C Ezell

For training exercises, where only blank cartridges were to be fired, a chrome-plated blank firing attachment (BFA) was screwed onto the threaded muzzle of the rifle in place of the flash hider. The short-lived initial version, which closely resembled the flash hider, was rejected by the German Army.

Several minor cosmetic changes were effected to the body and internal components of the BFA over the years, but the basic function—that of preventing a projectile leaving the bore should a live cartridge inadvertently be fired—remained the same. As shown in fig 694, the BFA could be adjusted by means of a screwdriver or cartridge rim to allow for a maximum or minimum restriction on the gas passage, to ensure positive weapon function.

Magazines

The standard magazine of the German Armed Forces was straight-sided, of 20-round capacity, and made of aluminum. The steel magazine was supposedly only substitute standard. But from the maintenance standpoint, it is easier to re-phosphate a steel magazine than to re-anodise an aluminum one.

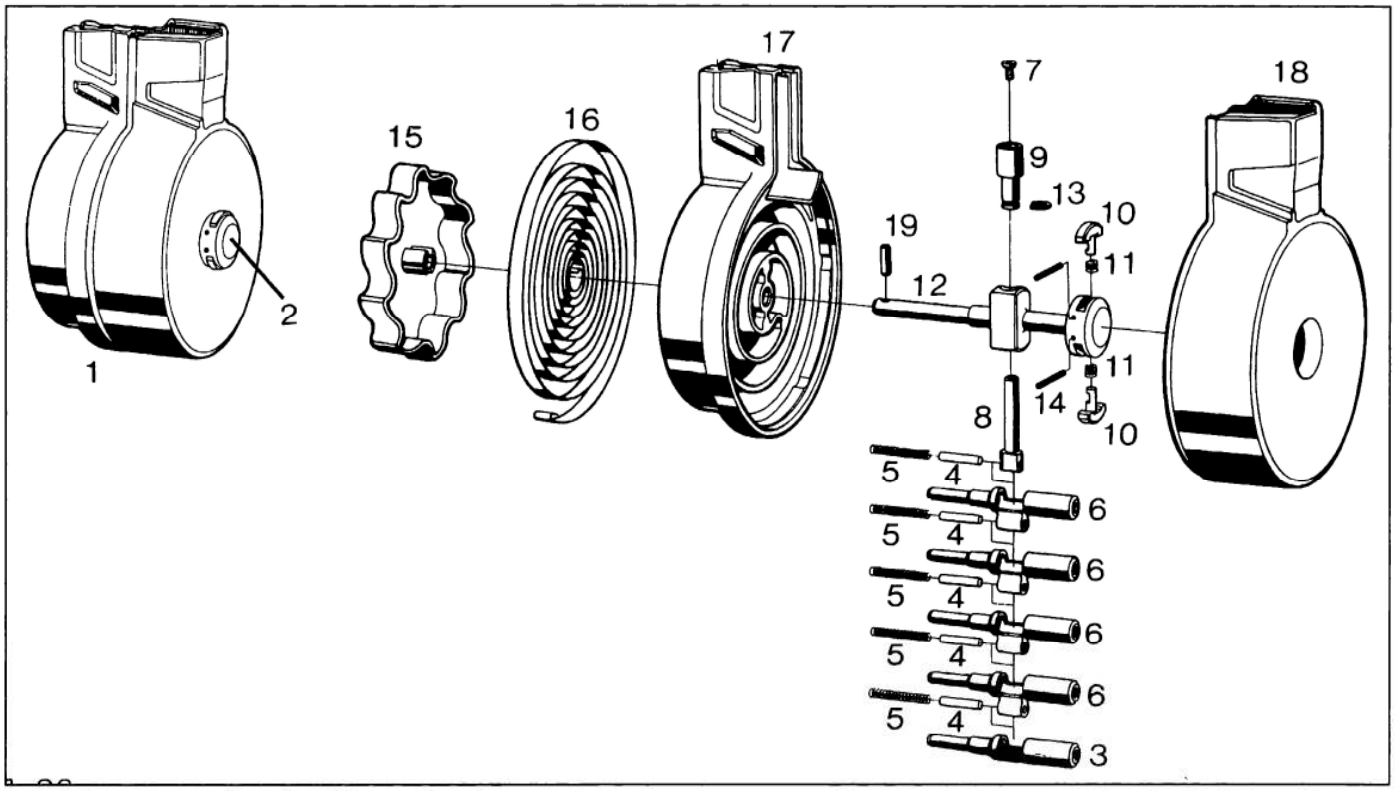
696. A comparison of two styles of steel 20-round magazines for the G3 rifle.
Left: early, with curved body.
Right: later, with straight body. courtesy H&K GmbH

697. The 20-round aluminum magazine, standard-issue in the *Bundeswehr* for the G3 rifle.
Left: as packed for long-term storage in rustproof paper with a corrosion inhibitor.
MoD Pattern Room collection, photo by Richard Jones

698 (right). A closeup of the aluminum magazine in fig 697, showing markings indicating manufacture by Kongsberg arsenal in Norway in April, 1966, but marked with an NSN with country code 12 (Germany).

There was no need to issue a new NATO stock number if the component was exactly the same as an existing one. In this case the magazine was made for Germany, the first country to issue this stock number based on the drawings and specifications.

MoD Pattern Room collection, photo by Richard Jones



699. The 50-round spring-driven aluminum accessory drum magazine for the G8A1 automatic rifle, shown assembled at upper left and disassembled at right.

Note the five dummy rounds which follow the cartridges to ensure all are fed through the magazine well interface (numbers 17 and 18). courtesy H&K GmbH

Optical Sights and Mounts

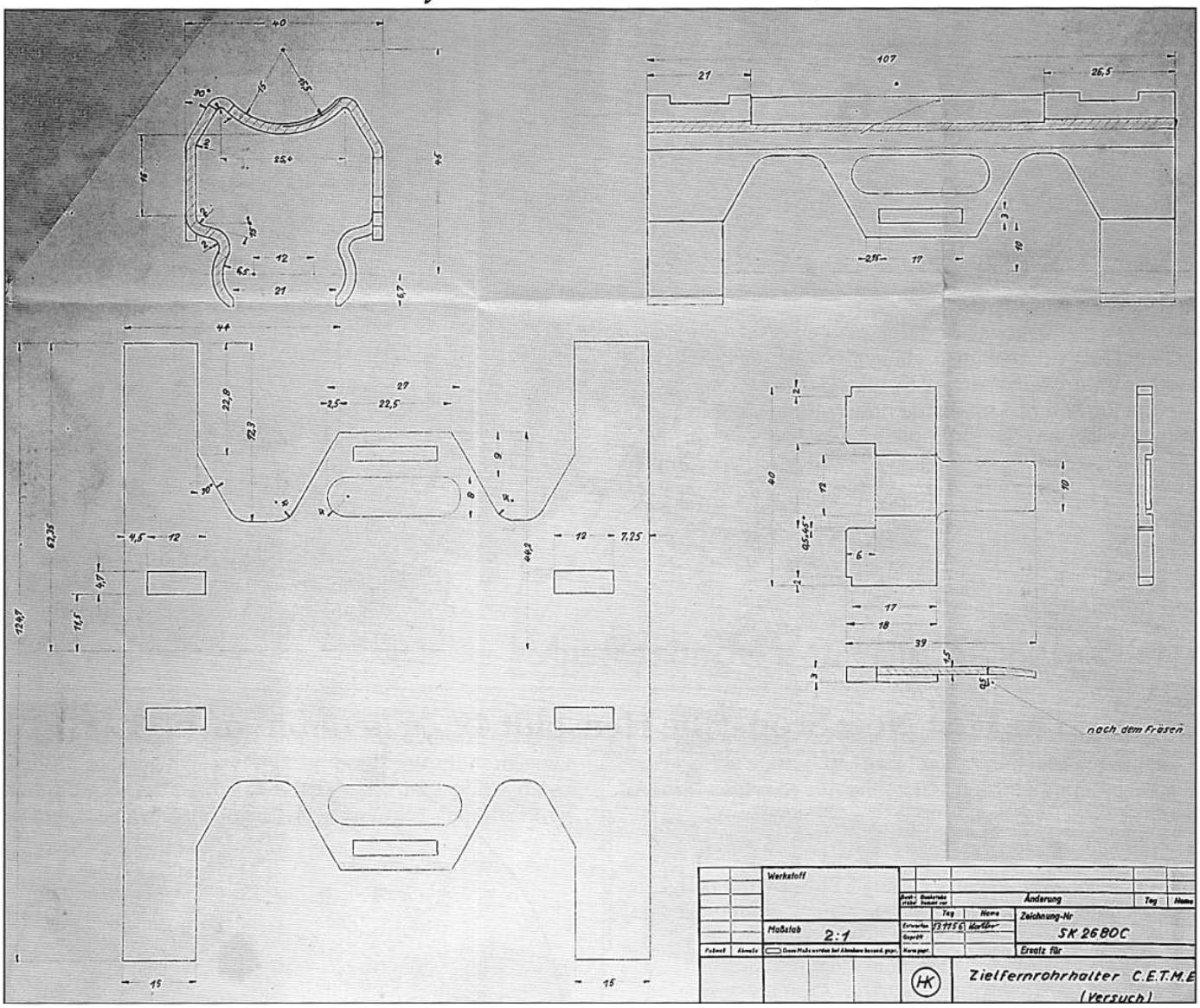
The Earliest Purpose-Built DM3 CETME with Infrared Night Sight Unit

700. Left side view of an early DM3 CETME (with change lever on right), fitted with an active (infra-red) night sighting device on a stamped mount which straddles the rear tangent sight.

Note the activation switch behind the pistol grip and the special purpose-built buttstock, which houses the electrical connections between the rifle and the battery pack (far right).

courtesy H&K GmbH

The First "*Zielfernrohrhalter* CETME", for the ZF4



701. An early H&K drawing dated November 13, 1956, titled *Zielfernrohrhalter C.E.T.M.E. Versuch* (CETME scope mount, trial), showing the basic stamping, left, and two views of the formed unit, above.

A number of different versions of the early stamped scope mount were experimented with before the final machined pattern was established.

courtesy Matthias Schörmal

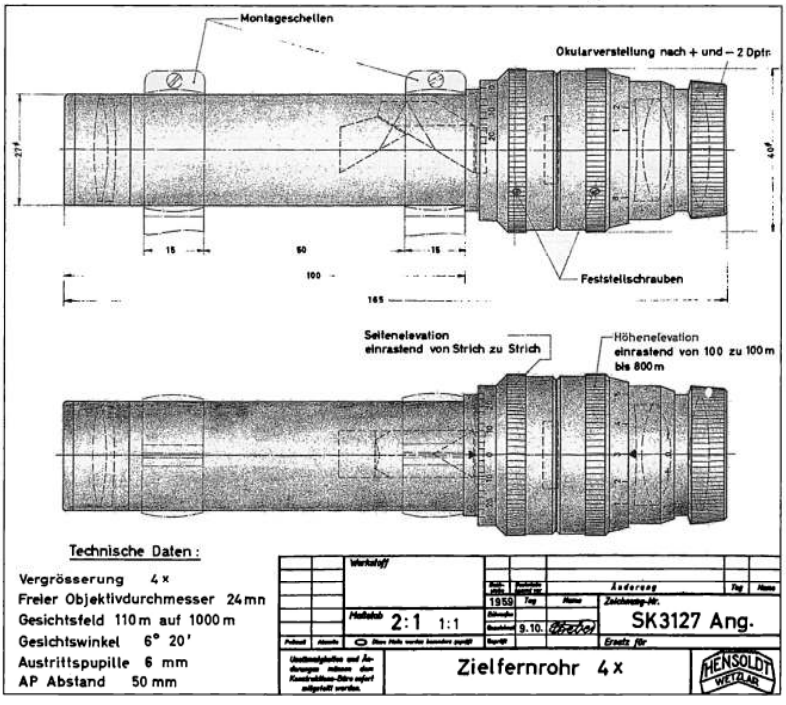
702. Right side view of an early H&K StG CETME fitted with a WWII-pattern ZF4 scope in an improved version of the stamped scope mount shown above.

703 (right). Left rear three-quarter closeup of an early H&K StG CETME fitted with a ZF4 telescopic sight, in yet another improved version of the stamped scope mount.

Note the "no rib" magazine housing, the early form of change lever, and the "orthopedic" wood pistol grip.

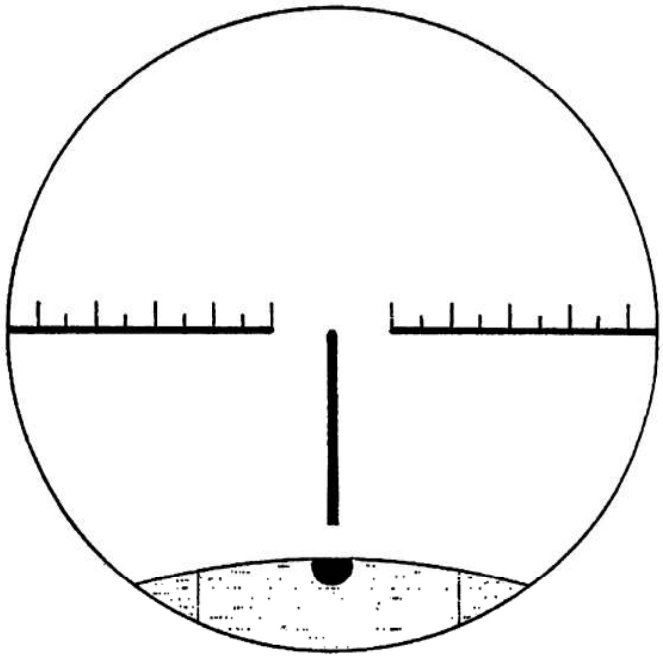
courtesy H&K GmbH

The First New Scope: the Hensoldt 4x *Zielfernrohr* of 1959



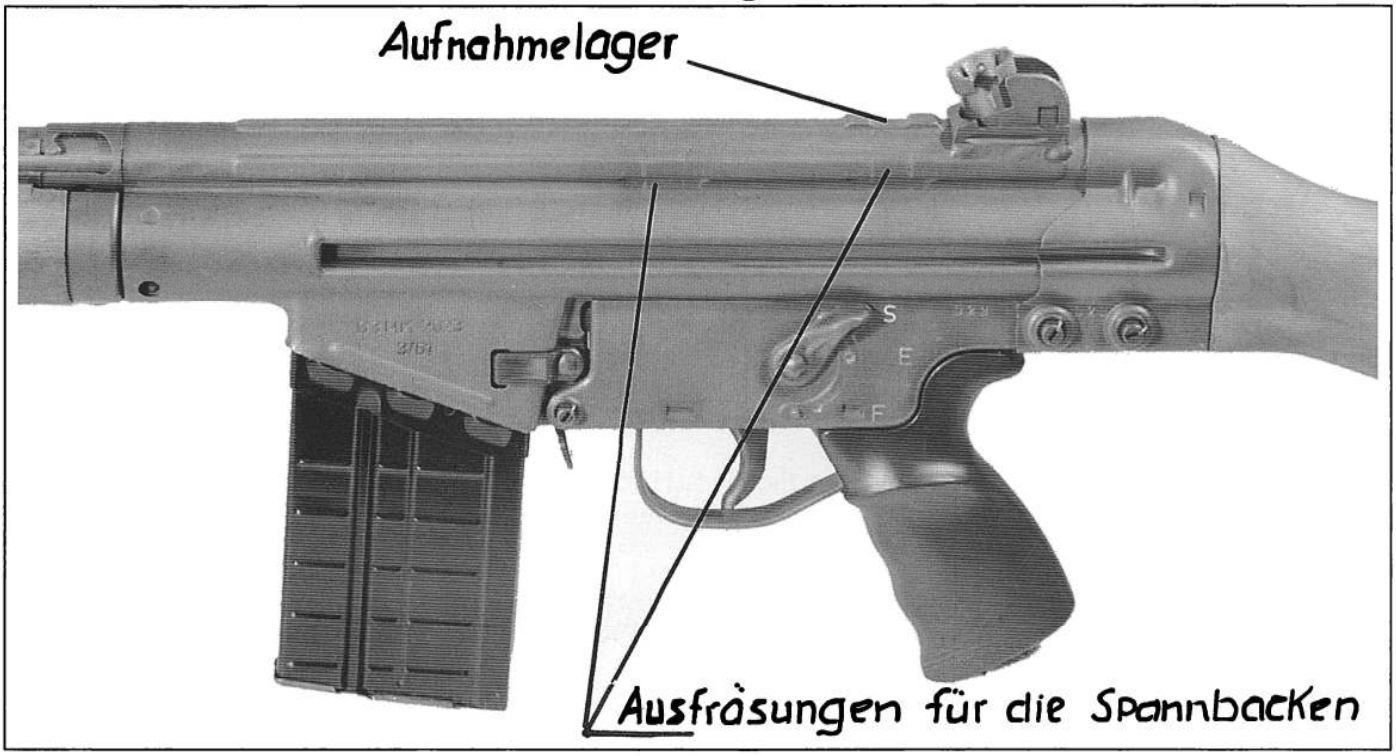
704. Drawing no SK3127 by Hensoldt, Wetzlar, dated October 9, 1959, titled *Zielfernrohr* 4x (telescope 4-power), showing top (above) and left side views of the first new postwar telescopic sight intended for use with the G3 rifle.

courtesy Walter Schmid



705. The reticle pattern used in the 1959 Hensoldt 4-power telescopic sight. courtesy Walter Schmid

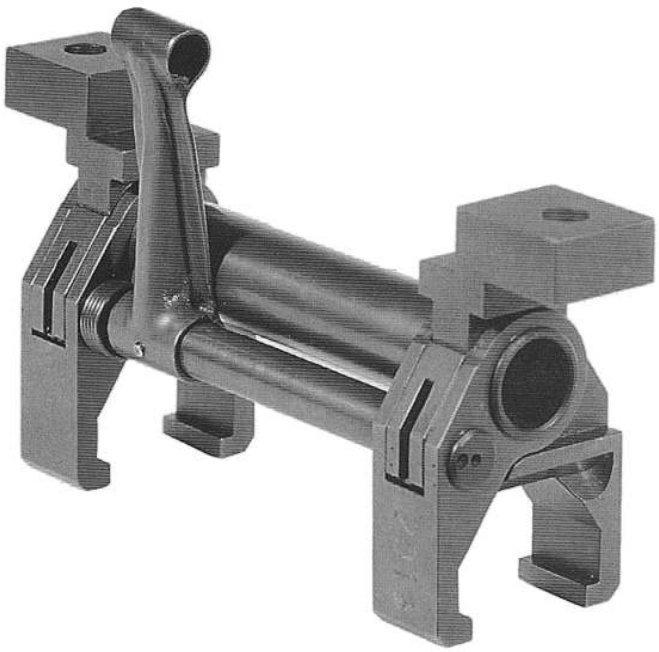
The Mount for the "*Zielfernrohr beim Gewehr* G3" and the *Infrarot-Nachtzielgerät*



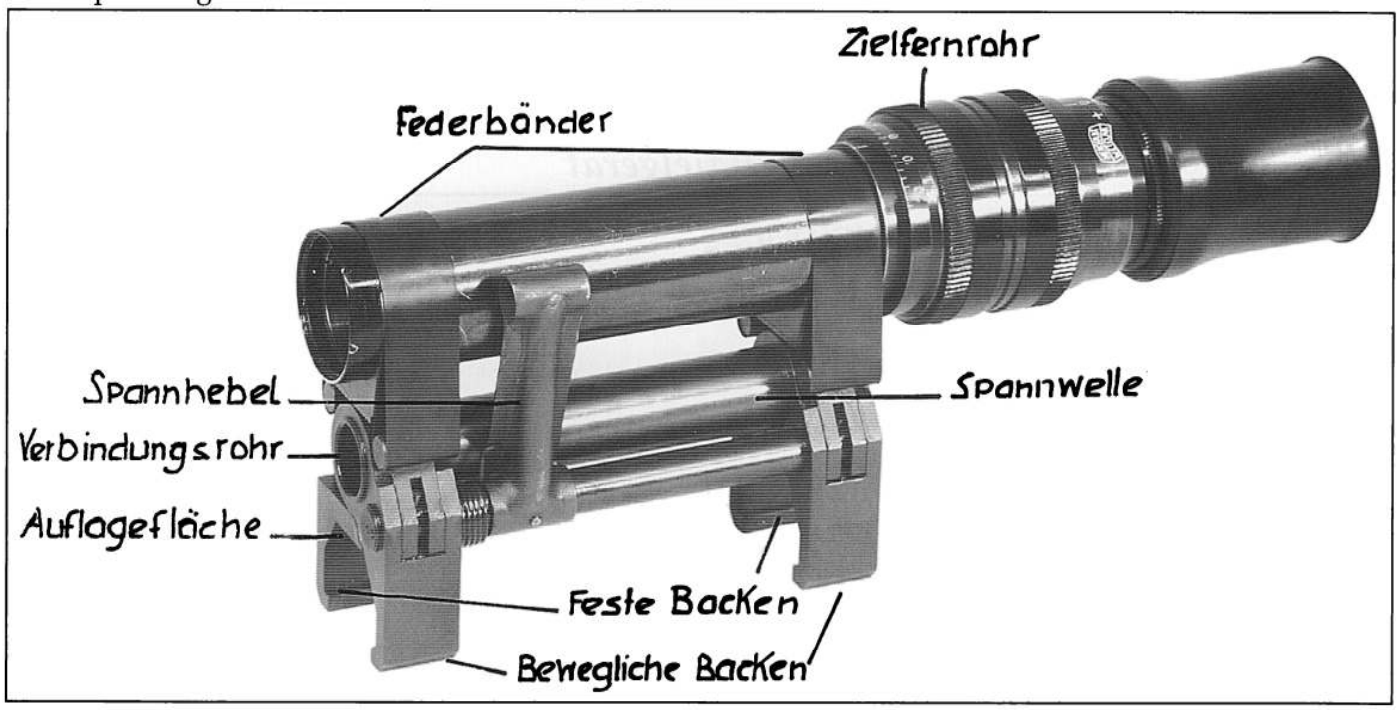
706. The first step towards a complete redesign of the quick-detachable scope mount was the addition of scope mount locking/registry blocks built into the receiver stamping of each rifle, as shown here in a photo dated March 15, 1961 featuring G3 serial no 2024, manufactured in February, 1961.

This was in accordance with the stated requirement that every rifle should be ready to accept a telescope sight, so that if captured snipers would not be found armed with specialist weapons. courtesy Walter Schmid

707. From an H&K brochure dated March 15, 1961, a left rear three-quarter view of the prototype of the new quick-detachable scope mount, the first mount for the *Zielfernrohr beim Gewehr G3* and the *Infrarot-nachtzielgerät* (telescope sight for the G3 rifle and infrared night sight equipment). The locking lever is shown in the clamped position. courtesy Walter Schmid

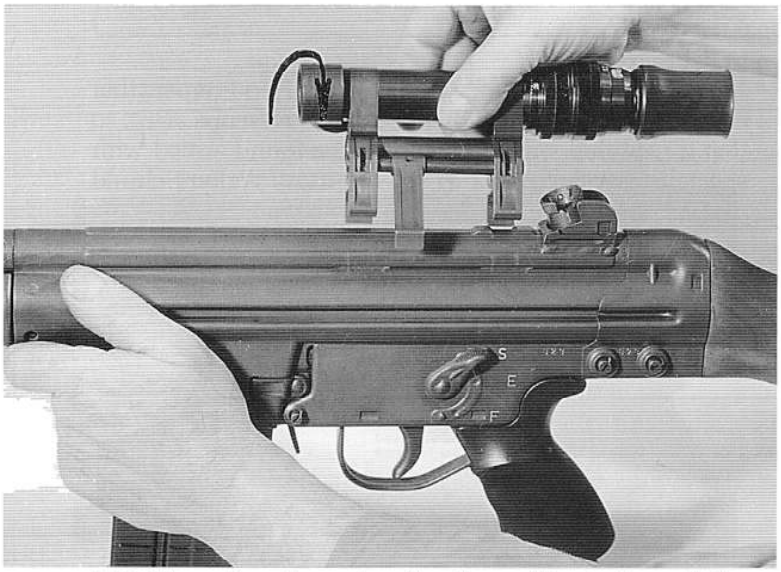


708. From the H&K brochure dated March 15, 1961, the prototype scope mount shown with locking lever in the unclamped position, for installation/removal.
courtesy Walter Schmid

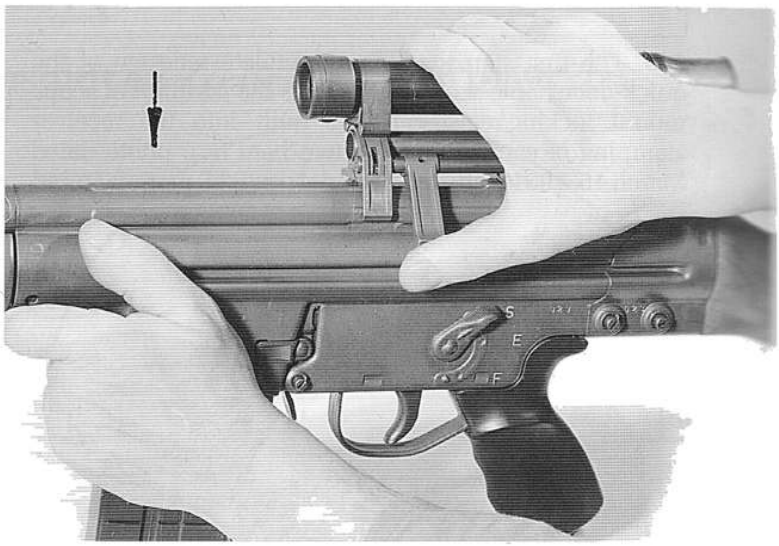


709. From the H&K brochure titled *Verläufige Beschreibung des Zielfernrohrhalters und Anleitung für das Aufsetzen und Abnehmen des Zielfernrohrs beim Gewehr G3* (Description of Scope Mount and Instructions for Installation and Removal on the G3 Rifle) dated March 15, 1961, a left front three-quarter view of the 1959 Hensoldt 4-power scope (fig 704) fitted in the prototype quick-detachable mount shown above.

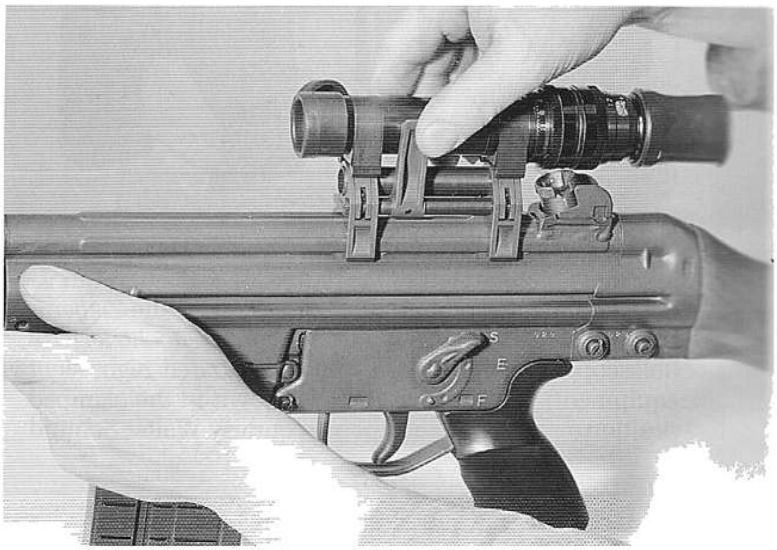
Note the tube (*Verbindungsrohr*), through which the iron sights could be viewed. courtesy Walter Schmid



710. From the above handbook, an illustration of the method of attaching the scope and mount by first positioning the right side on the integral receiver rails.
courtesy Walter Schmid



711 (above, right). The mount is then swung downward so the claws are positioned under the receiver rails on both sides. courtesy Walter Schmid



712 (right). The locking lever is then raised to secure the clamps of the mount on the receiver rails.
courtesy Walter Schmid

Experimenting with the Leitz "Elcan" Scope and Mount

713. A photo dated September 25, 1963, showing a left side closeup of H&K G3 serial no 161213V (*Versuch*; experimental) dated July, 1962, experimentally fitted with the Leitz "Elcan" (Ernst Leitz, Canada) telescopic sight and mount, as adopted by the Canadian Armed Forces for use on their C1A1 sniper rifles.

Note the (in-the-white) spacer between the base and the scope, necessary to clear the rear iron sight.

courtesy H&K GmbH

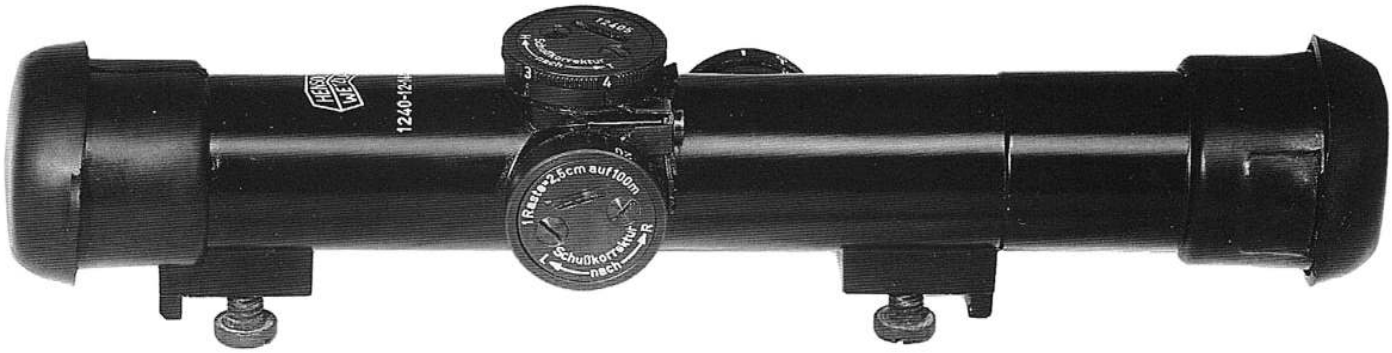
Settling on the Hensoldt "Telescope Sight 4 x 24" (ZF G3) and Mount

The first type of telescopic sight actually adopted by the German military for the G3 rifle was the familiar Hensoldt "Telescope Sight 4 x 24" (ZF G3). The ZF G3 was produced in large numbers and features in several illustrations throughout this book.

The initial intention was to be able to convert any standard rifle into a sniper rifle by the simple addition of the G3ZF. When so fitted the range of the rifle was officially extended from 300 to 600 metres.

The ZF G3 design was actually owned by the German government, and it was also produced for the German military by a firm named Kaps in Asslar, near Wetzlar.

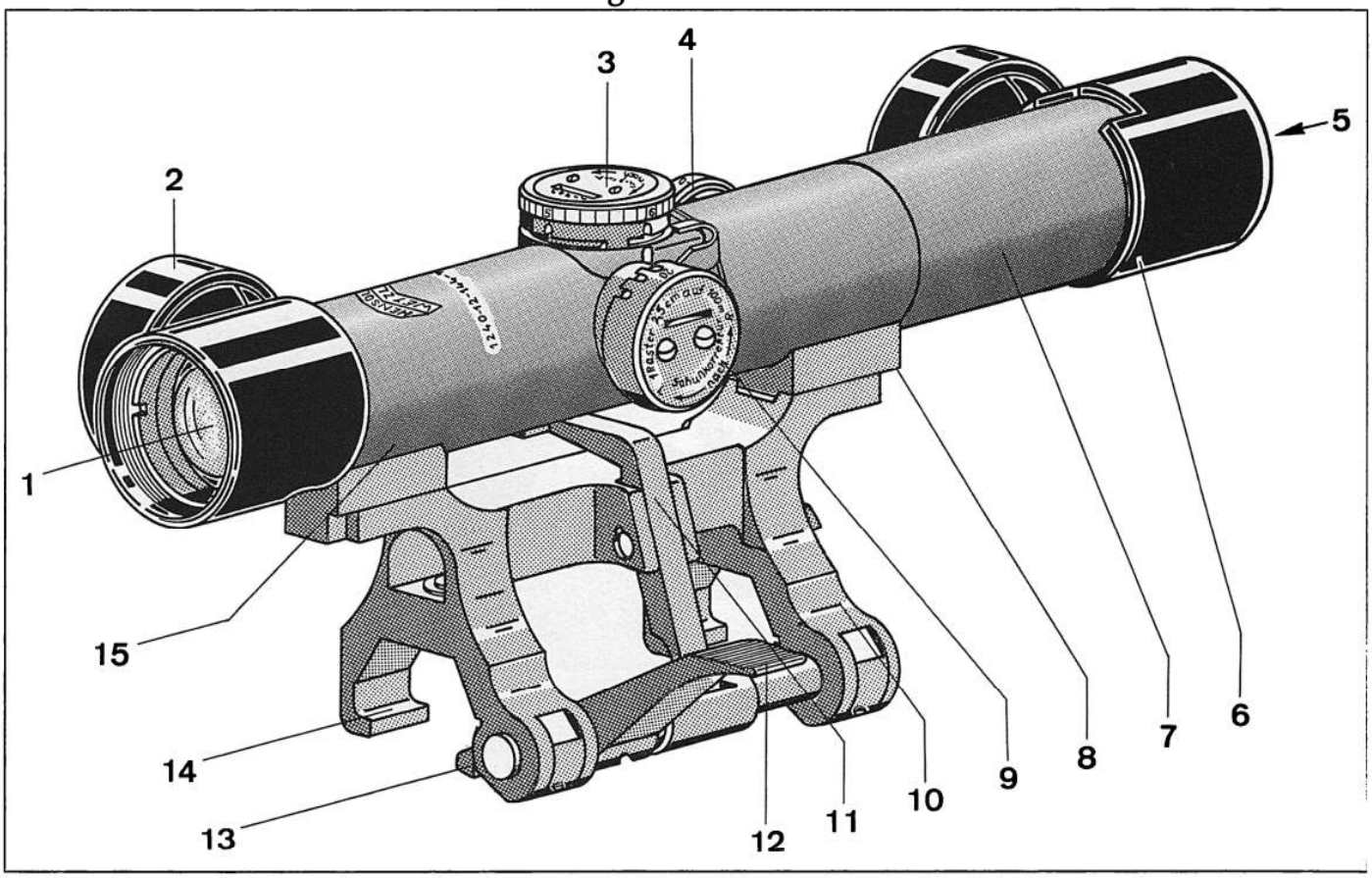
The same robust mount system was also used to mount the later generations of active (Infrared) and passive night sighting devices on the G3.



714. Left side view of the Hensoldt "Telescope Sight 4 x 24" (ZF G3), adopted by the German *Bundeswehr* and several other European armies for sniper use.

Note the integral mounting blocks and screws, designed for direct attachment to the mount without the bands used previously. courtesy H&K GmbH

Describing the Hensoldt ZF G3



715. A drawing from the Hensoldt brochure quoted in the text showing a left front three-quarter view of the "Telescopic Sight 4 x 24", adopted for sniper use by the German Armed Forces.

Compare with fig 709: this is the first illustration showing the final version of the mount with redesigned clamp and stop levers and no bands around the scope. The numbered components are identified as follows:

1. objective lens
2. front lens cap
3. range adjustment
4. diopter adjustment ring
5. eyepiece
6. rear lens cap
7. eyepiece unit
8. guide bar
9. lateral (windage) adjustment
10 mount
11. stop lever
12. clamping lever
13. clamping claw (2)
14. supporting claw (2)
15. tube unit

courtesy Wolfhart Fritze, FGS Frex Ltd

716. Left side view of an early G3ZF, marked "S G3 HK 0115" and dated July, 1963, fitted with a Hensoldt Telescope Sight 4 x 24 (ZF G3) in the early iteration of the machined mount with high-mounted lever and axial tube for iron sight viewing.

Note the unusual wood-and-metal handguard.

courtesy H&K GmbH

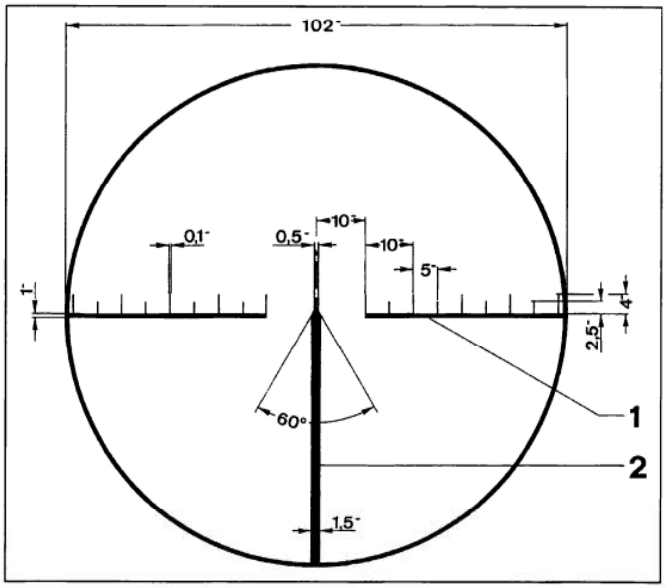
717. Left side closeup of an HK41 marked "HK41 - 10 B 501", dated November, 1965, showing the method of locking the final version of the mount for the Hensoldt G3ZF.

This later version of the mount also did away with the iron sight aiming tube, the upper portion being hollowed out axially to allow unobstructed use of the iron sights.

courtesy H&K GmbH

The Hensoldt 4 x 24 telescope sight is described in a brochure dated February, 1985 produced by M Hensoldt & Söhne Optische Werke AG of Wetzlar, excerpted as follows:

Short designation: . . . . . *ZF G3*
Drawing no: *33 01 08*
NATO Stock No: *1240-12-144-0716*
TDv Series: *1240/027*



718 (right). A dimensioned diagram of the reticle pattern of the Hensoldt ZF G3.
The numbered items are identified as:

1. side scale.
2. sighting mark [post], 1.5mm wide with a 60° angle on top.

courtesy Wolfhart Fritze, FGS Frex Ltd

719. A soldier of *Gebirgsjägerbataillon* 232 during a winter exercise on the Reiteralb training area in Bavaria.
The weapon is a G3A3ZF. When fitted with the G3ZF sniper scope the range is officially extended from 300 to 600 metres. courtesy VS Books/Carl Schulze

Purpose

The ZF G3 is used for exacter aiming with rifle 7,62mm x 51 G3A3ZF up to a distance of 600m. It serves the gunner for targeting and aiming and enables observation of the enemy and the effect on the target even at a greater distance.

Measurements

Length (with caps): 228mm
Width: 50mm
Height: 95mm
Case: . . . . . 65 x 105 x 230mm

720. Soldiers of *Fallschirmjägerbataillon* 314 during a live-fire exercise on Sennlager ranges in 1998. The man above is firing a G3A3ZF. Note the fired case deflector, added to the receiver of the rifle in accordance with the 1991 regulation (discussed in Chapter Seventeen).

courtesy VS Books/Carl Schulze

Weights

Telescope with [mount]: . . . . .67kg [1.47 lbs]
Case and accessories: . . . . . .38kg [.84 lb]
Total weight: . . . . . 1.05kg [2.3 lbs]

Optical Data

Telescope magnification: 4x
Entrance pupil: 24mm
Exit pupil: 6mm
Eye relief: . . . . . 60mm [2.36"]
Field of view angle: . . . . . 100" ^/= 5°40'
Field of view at 1,000m: 100m
Filter: . . . . . NG4, grey
Optical length: . . . . . 195.9mm [7.7"]

Short Description

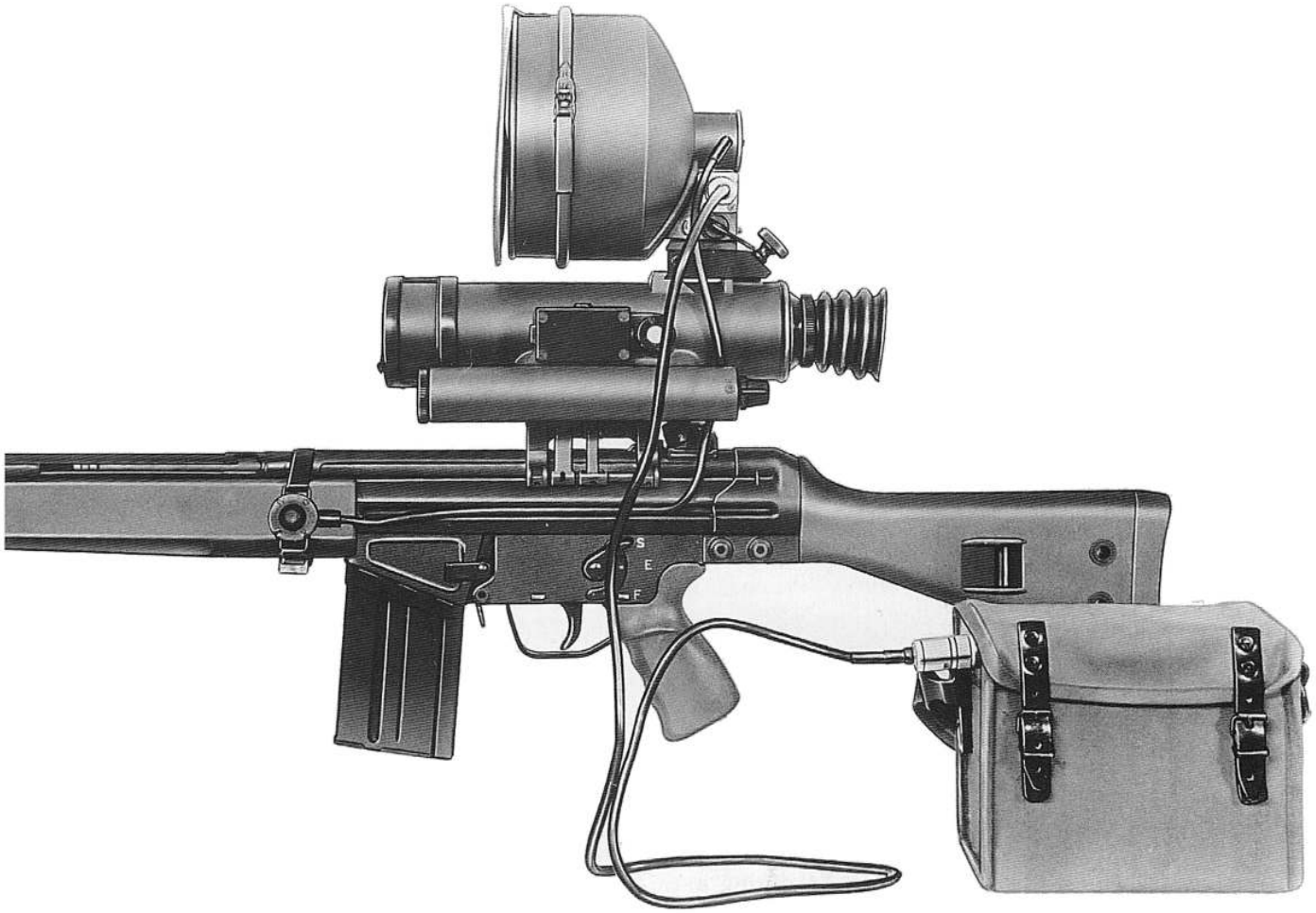
The ZF G3 is a monobjective/monocular telescope sight with a lens erecting system and 4 power magnification. The superelevation angle is adjustable for shooting distances from 100m to 600m.

All air-glass surfaces of the optical components are coated with a wipe-proof reflection reducing coating. The telescope sight is so well sealed that even during sudden temperature changes and spray-water influences it remains useable.

For absorption of intensive sunlight a grey filter can be fixed on the eyepiece side.

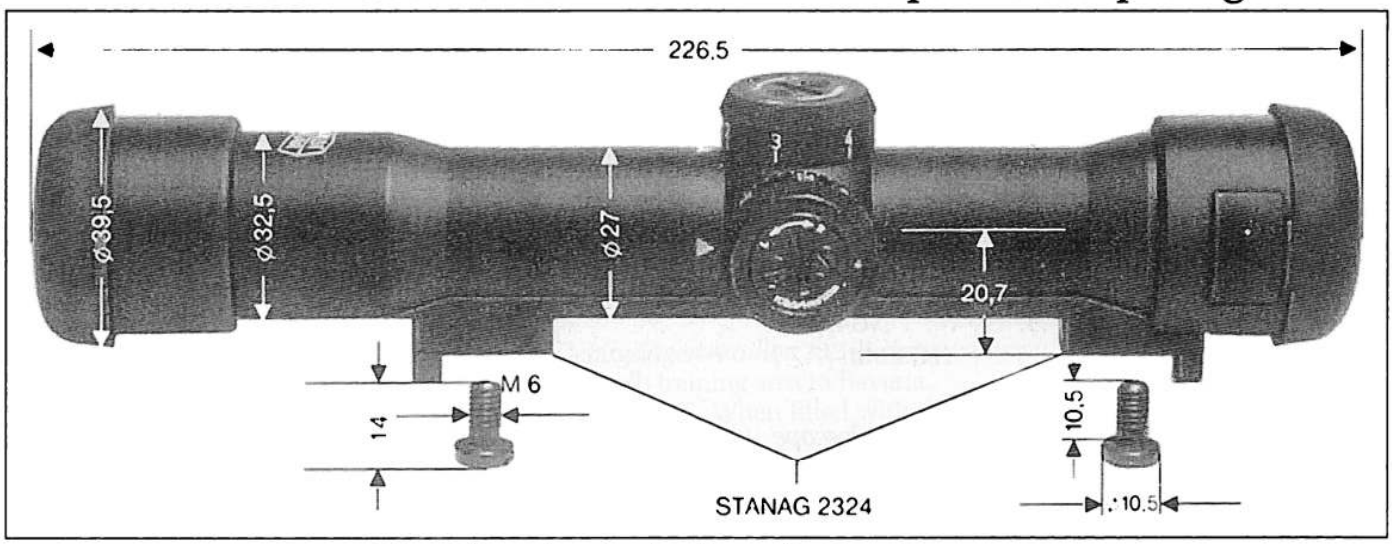
The ZF G3 consists of [quoted numbers reference those shown in fig 715]:

1. *The tube unit (15) with the objective (1) range adjustment (3) for sight-bar range adjustment, lateral adjustment (9) for correcting drift in traverse and for adjusting lead angle, diopter adjusting ring (4) for compensating subjective sight deficiency of +/- 2 dpt . .*
2. *Eyepiece unit (7) with the two lenses of the erecting system, [and] eyepiece, consisting of the field lens and eyelens.*
3. *Holder [mount] (10) with two supporting claws (14), clamping lever (12) for turning the two clamping claws (13) for mounting ZF on rifle.*
4. *caps (2 and 6) for protecting the tube and eyepiece unit and two invertable protection caps (which can be closed when ZF G3 is not in use) for protecting the objective (1) and the eyepiece (5).*

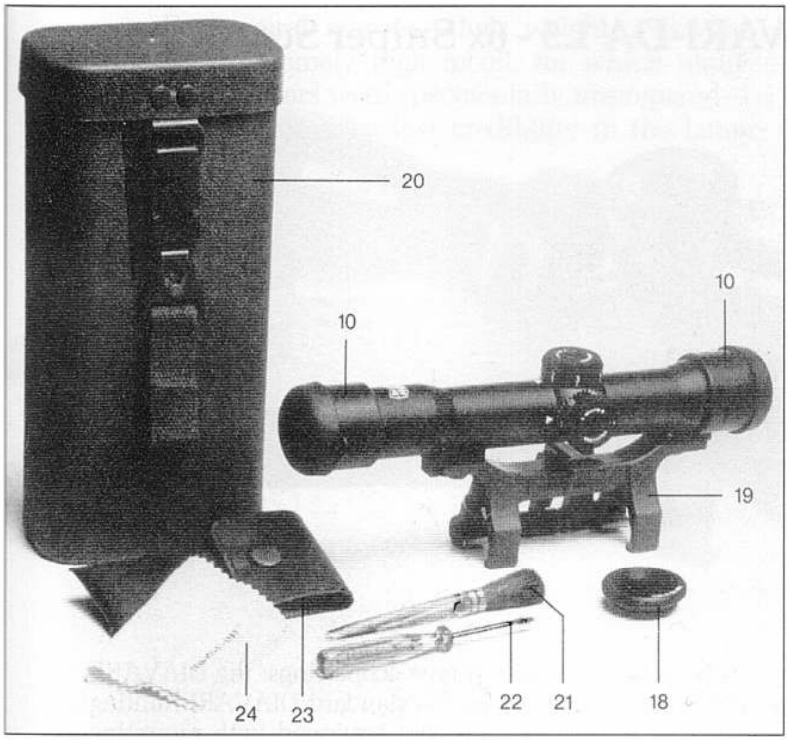


721. Left side closeup of a late G3A3 rifle with export handguard, fitted with an Eltro infrared night sight device. Compare with fig 700: this is a much-improved unit, activated by pressing the button at the rear of the handguard. courtesy H&K GmbH

The Modernised Hensoldt FERO-Z 24 Sniper Telescopic Sight



722. Dimensioned drawing of the four-power *Scharfschützen-Zielfernrohr* (Sniper Telescope Sight) FERO Z-24, described in the text. Unlike the ZF G3, the FERO Z-24 was a proprietary item, developed and manufactured by M Hensoldt & Söhne Wetzlar, Optische Werke AG. courtesy Wolfhart Fritze, FGS Frex Ltd



The FERO-Z 24, a modernised version of the ZF G3, was a proprietary Hensoldt design not owned by the German government. The reticle pattern was identical to that of the standard ZF G3 sight (fig 718), and the accessory package, including the reinforced cloth-covered storage case, was also quite similar.

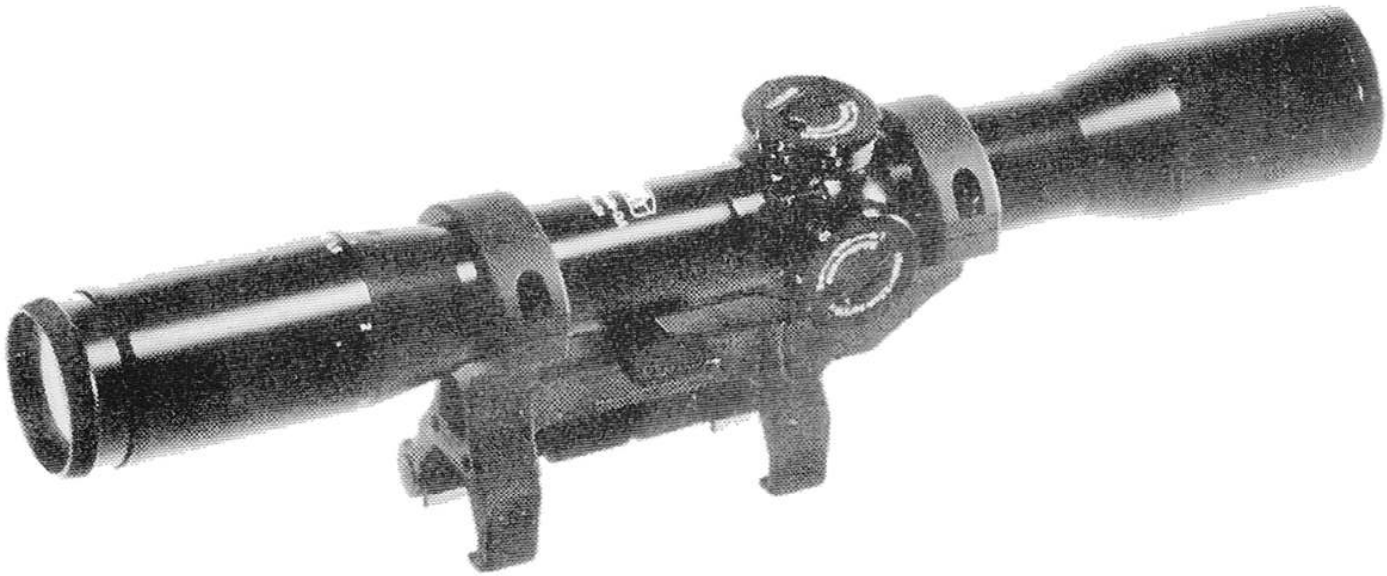
723 (left). The FERO-Z 24 scope and accessories. The numbered items are described in the Hensoldt catalogue as follows:

10. protective caps
18. grey filter
19. sight holder [mount]
20. storage case
21. dust brush
22. screwdriver
23. tool bag
24. cleaning cloth.

courtesy Wolfhart Fritze, FGS Frex Ltd

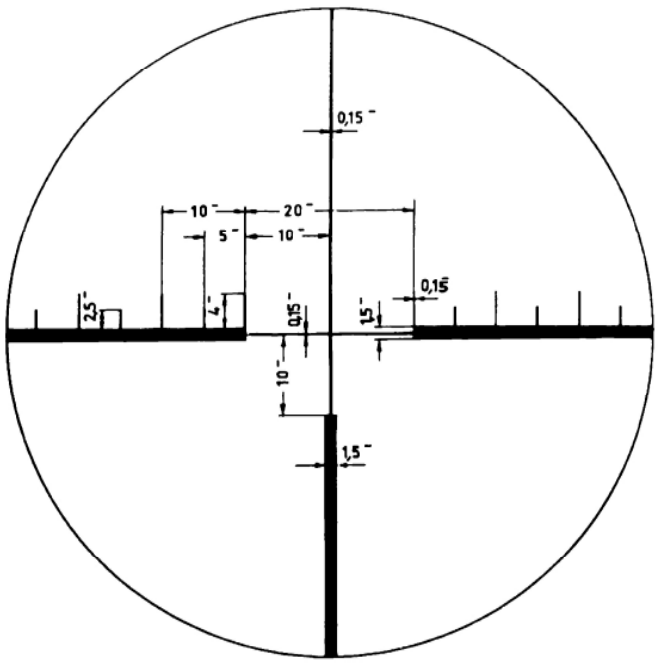
724. A soldier of *Jägerbataillon* 371 armed with a G3A3 fitted with the *Biderstärker* (BiV) passive night vision scope, in a photo taken during exercise "Jäger 98".
The BiV unit weighed 1.9kg (4.2 lbs).
courtesy VS Books/Carl Schulze

Getting Serious: the Zeiss DIAVARI-DA 1.5 - 6x Sniper Scope



725. Right rear three-quarter view of the Zeiss DIAVARI-DA 1.5 to 6-power variable sniper scope and mount, developed for the G3 rifle for police use during the 1970s. Note the commercial type scope rings: the DIAVARI-DA was developed from the standard DIAVARI hunting telescopic sight, and was not equipped with mounting blocks. courtesy Wolfhart Fritze, FGS Frex Ltd

The Zeiss DIAVARI-DA 1.5 - 6 variable power telescopic sight was a version of the standard DIAVARI hunting scope adapted to the G3 SG1 marksman's rifle, discussed in Chapter Twenty. This sniper version of the G3 was quickly designed due to an urgent demand from German police forces during the 1970s, when the police had practically no sniper rifles.



726 (right). The reticle pattern of the Zeiss DIAVARI-DA, designed to allow precise range measurement.

According to the handbook, this reticle serves to determine the distance with a given target size. The distance is calculated by multiplying the target size in metres x 1,000, and dividing by the number of graduations covered.

Example: a car of 5m length covers 25 graduations on the reticle: 5 x 1,000 ÷ 25 = 200m.

courtesy Wolfhart Fritze

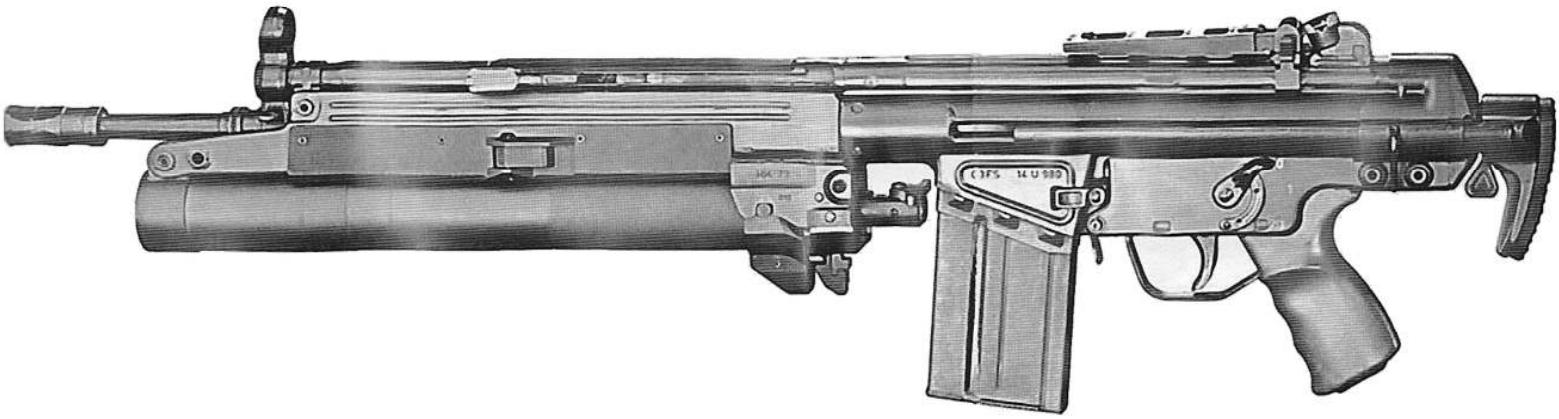
Rifle Grenades

Much had been made during the early days of the CETME programme, both in Spain and in Germany, of the rifle's ability to launch rifle grenades from the muzzle, first by means of a separate adapter and then right off the redimensioned flash hider/grenade launcher with no extra devices, other than a grenade launcher sight, designed to clip around the front sight assembly, being necessary.

The late Henk Visser of NWM had been particularly active in promoting the rifle grenade concept. and it was he who had been instrumental in standardising the 22mm flash hider diameter for launching grenades.

For several reasons—their weight, awkward bulk and extremely high recoil, for which many conscript soldiers were spectacularly unprepared—the rifle grenade idea lost credibility in the latter decades of the 20th century, and the "area fire" capability of the individual soldier was soon provided by separate or "piggyback" launchers firing much more compact 40 and even 30mm grenades.

The H&K "G3-TGS" with the HK79 40mm Grenade Launcher



727. Left side view of the H&K "G3-TGS": a G3A4 fitted with the HK79 40mm single-shot grenade launcher. The launcher is designed to replace the handguard and attach without tools. The barrel swings down at the rear to load, and the device is fired by pressing the flat knurled block under the cocking handle.

Note the folded-down grenade sight, which attaches to the telescopic sight mount rails on the receiver without tools. courtesy the late Dr Edward C Ezell

In excerpts from a brochure dated December, 1984, Heckler & Koch introduced their "G3-TGS" (G3 Tactical Group Support System) as follows:

This new development—combination of the G3 rifle with the HK79 grenade launcher into a single system for additionally firing 40mm calibre grenades—brings greater effectiveness into the infantry combat scene.

. . The HK79 40mm calibre grenade launcher is mounted on the G3 automatic rifle in place of the handguard without using tools.

This does not affect the accuracy of the rifle element, since its barrel is still free to oscillate with the add-on launcher fitted. Handling and operation of the G3 remain as practical as ever . .

The HK79 grenade launcher is a single-round weapon with a tilting barrel. To load it, the barrel is unlatched and drops down under its own weight. The round is inserted, and barrel closed. The tilting barrel will take rounds of any length.

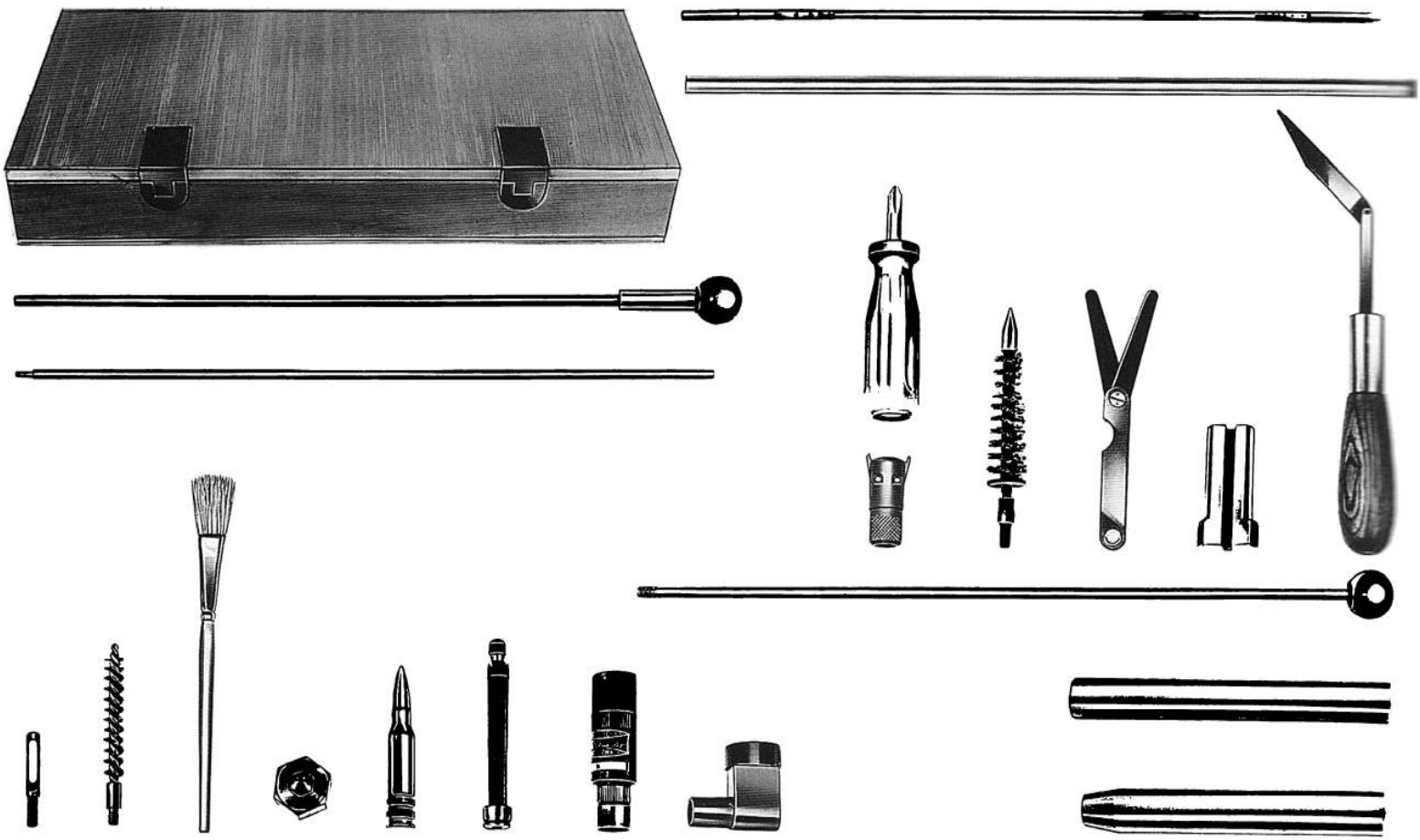
To fire the launcher the firing pin is cocked by hand. The trigger mechanism is on the left hand side of the handguard, and is actuated by pressing it. This mechanical trigger system ensures maximum safety for the firer.

Fitted at the rear of the device is the sliding safety catch, the status of which is indicated by coloured rings showing "Safe" (white) or "Single fire" (red). The weapon can be loaded, unloaded and the firing pin cocked in both of these positions.

The fold-down ladder-type rear sight is fitted to the rear telescopic sight mounting on the receiver of the parent rifle (without tools), and is used in conjunction with the rifle's front sight to aim the launcher.

The sights cover out to 200m. The rifle's front sight and flash hider can be used to aim over greater ranges.

Tools



728. A selection of tools for the G3 rifle, from a 3rd echelon set.

Top row, from left: tool chest; bore gauge and protective cover.

Middle row: cleaning rod (in two threaded sections); rear sight adjusting tools (fig 345); chamber brush and rod (below); headspace feeler gauge; tool to widen damaged front sight hood; unidentified tool (with wooden handle).

Bottom row: threaded cleaning rod eye for cloth patch; threaded bore brush; dust brush; grease nipple (screws onto flash hider threads on muzzle so bore can be hydraulically pumped full of grease to dislodge stuck pullthough or patch); *Werkzeugpatrone* (tool cartridge); broken shell extractor; two types of bore scopes; mandrels (far right) to straighten dents in operating rod tube.

courtesy H&K GmbH

For the individual soldier, one or other of the compact plastic cleaning kits shown in fig 681 was provided. Different sets of tools were available for the G3 and other roller-locked "family" members. These were of increasing complexity and versatility, depending on the level of maintenance provided by each level or echelon of the system. The tool chest and laid-out tools shown above are from a 3rd echelon set.

Training Aids

The Short-Lived "G3 - KK" (*Kleinkaliber*) Dedicated Training Rifle

729. Left and right side closeups of the dedicated G3 - KK (*Kleinkaliber*) dedicated training rifle serial no 00001, in calibre .22 long rifle.

Only a small number of these rifles were made up for use in *Bundeswehr* training centres and schools.

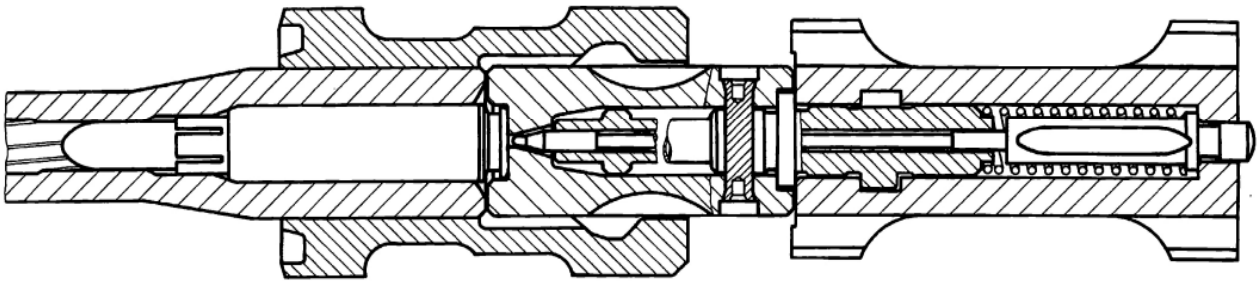
Note the two-piece blowback bolt, visible in the lower illustration.

courtesy Major (ret) Volker Kurtz, H&K GmbH

A small number of dedicated *Kleinkaliber* (smallbore) training rifles were made up by H&K and Rheinmetall, and used by the *Bundeswehr*. Unlike the BFA, which was issued and used to fire blank cartridges on exercises in the field, the KK rifles were reserved for short-range target shooting in training centres and schools.

The G3 KK rifle idea was soon replaced by the .22 calibre conversion kit, and the KK rifles were then sent down to battalion level.

The Lockless Bolt for Firing Plastic Cartridges



730. A diagram showing a top sectioned closeup of a G3 rifle fitted with the lockless bolt assembly. Note the absence of locking rollers in the bolt, and the chambered plastic training cartridge.

Different types of these cartridges were produced, some with rebated rims as an additional safety feature. Normally these cartridges featured brass rims, to ensure positive extraction. courtesy H&K GmbH

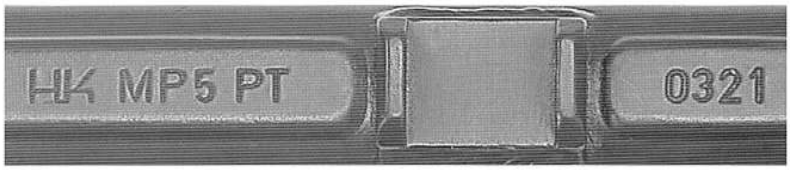
731. Two *Bundeswehr* soldiers on a training exercise. The MG42/59 at left is firing belted plastic training ammunition.

Note the loader's bipod-mounted G1 FAL rifle, at right.

732. Left side view of an H&K MP5 "PT" model, designed for firing plastic training ammunition exclusively. Note the special marking on the receiver.
MoD Pattern Room collection, photo by Richard Jones

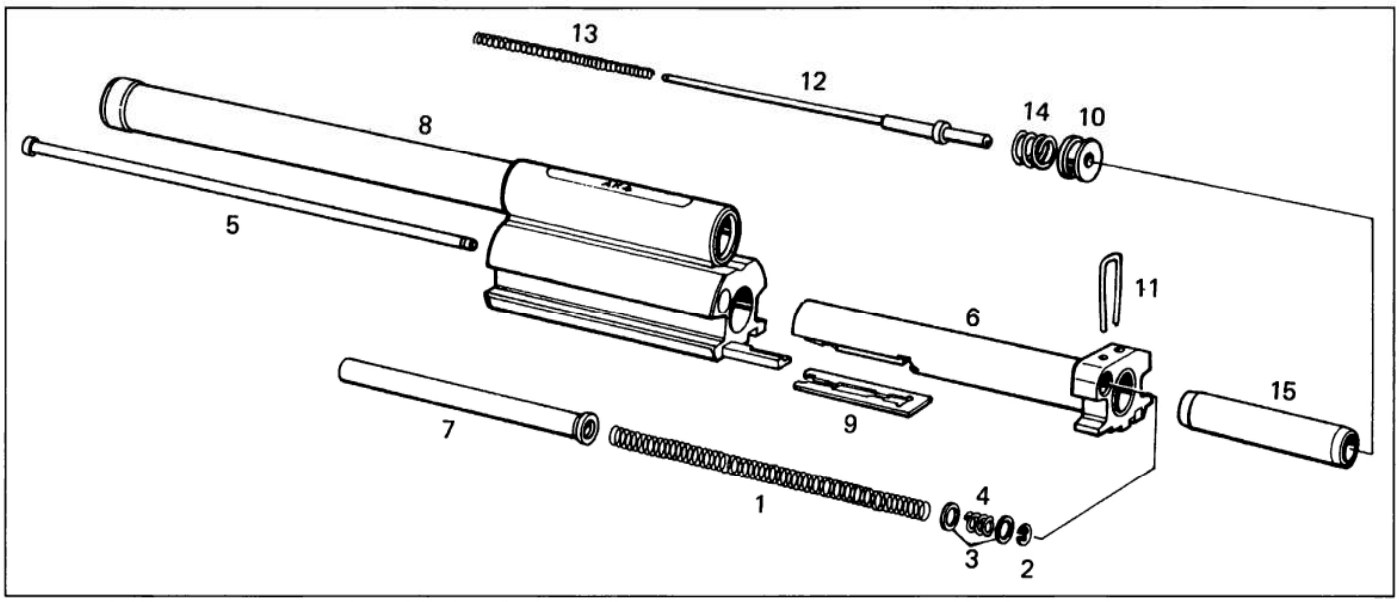
Various types of 7.62mm NATO and 9mm Parabellum plastic cartridges were manufactured, with differing reduced loadings for use at various ranges. These were indicated by different coloured plastic cartridge cases.

None of these was powerful enough to require a locked breech, and special rollerless bolt assemblies, which provided straight blowback action, were provided for firing plastic training cartridges in standard G3 rifles and MP5s.



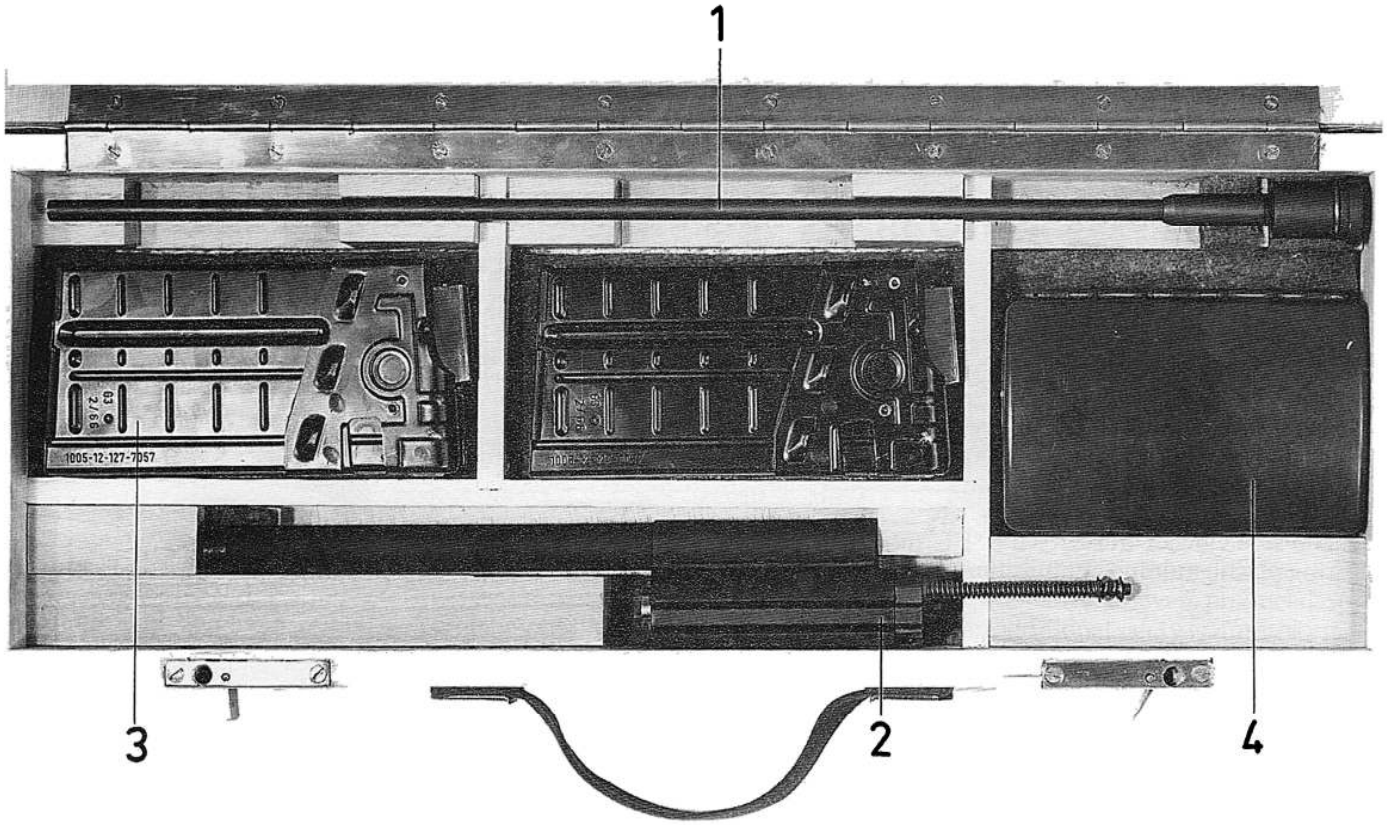
733. Top closeup of the above MP5 PT (Plastic Training) model, serial no 0321, showing markings.
MoD Pattern Room collection, photo by Richard Jones

The .22LR Subcalibre Conversion Unit



734. A drawing from a Swedish handbook showing an exploded view of the H&K .22 calibre conversion unit for the G3 rifle.

The numbered components are identified as follows: special bolt carrier (8), bolt (6) with firing pin assembly (10 - 15); extractor (9); offset return spring assembly (5, 7, 1, 2, 3, 4). courtesy H&K GmbH



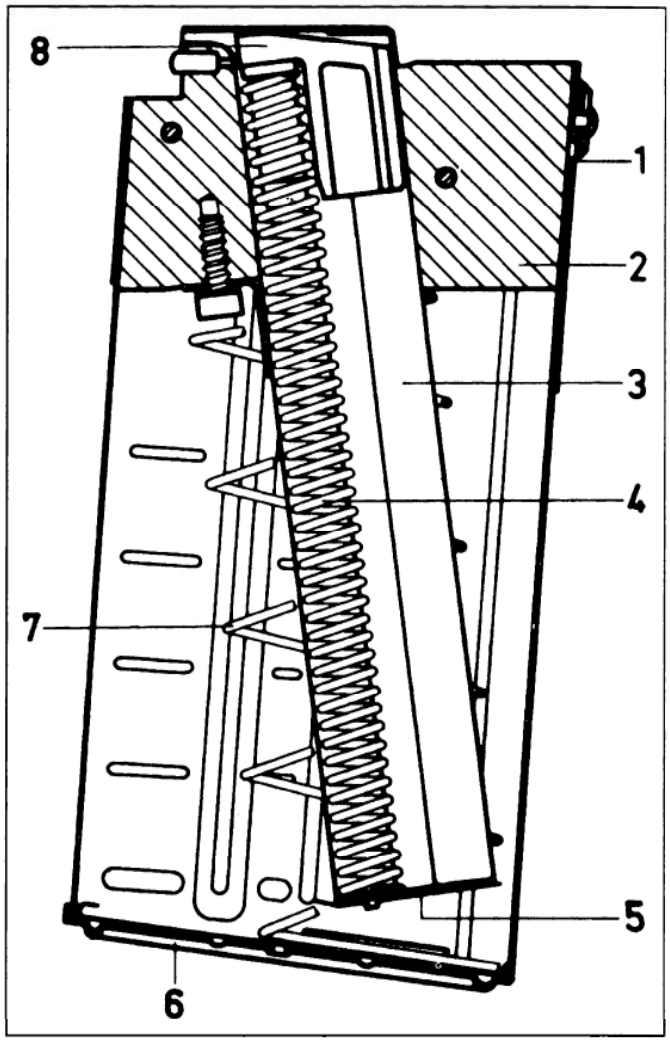
735. Manual illustration showing the .22 calibre G3 conversion unit in its fitted storage chest.
The numbered components are identified as follows:

1. subcalibre tube (barrel)
2. bolt assembly
3. magazine (2) (NSN 1005-12-127-7057)
4. cleaning kit (5.56 - 6.5mm)

courtesy H&K GmbH

The H&K-designed .22 calibre conversion kit replaced the dedicated *Kleinkaliber* G3s and was a better idea, because it could be used as required in any G3 rifle.

These kits were quite popular, and in addition to the kits designed to fit the G3 rifle a special one was produced and sold to several countries, including Canada and Great Britain, for use in their versions of the FAL rifle.



736 (right). Left side sectioned view of the magazine for the H&K G3 subcalibre conversion unit.
Note the plastic positioning block (2) retaining the angled 20-shot .22 calibre clip (3) within the coils of the standard mainspring (7) inside the body of a normal magazine (1). courtesy H&K GmbH

The Transport Crate

737. The H&K standard wooden transport crate with lid opened to show positioning of ten G3 rifles and their ancillaries (left).

This sturdy crate is designed to accept other weapons in the HK "family" by repositioning the vertical wooden spacers among the three possible positions, L, M and R.

courtesy H&K GmbH

When H&K products, including rifles, were sold abroad, they had to be packed securely before being shipped. A dedicated wooden crate was devised with slip-in spacers, dimensioned to hold ten G3 rifles in two layers, plus their ancillary equipment.

If required, the spacers in the crate could be rearranged to hold an equal number of HK33s or MP5s.

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Key to Abbreviations Used on Allied Documents Dealing with WWII Germany

- BAOR: British Army on the Rhine
- BIOS: British Intelligence Objective Subcommittee
- CIOS: Combined Intelligence Objectives Subcommittee
- HEC: Halstead Exploitation Centre. Over 15,000 German documents were collected at the now-closed Fort Halstead in England after WWII, and assigned British (HEC) identifiers.
- UNT: Unterlüss reports, prepared by technically oriented Germans who were ordered to "tell all" after the end of WWII.

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