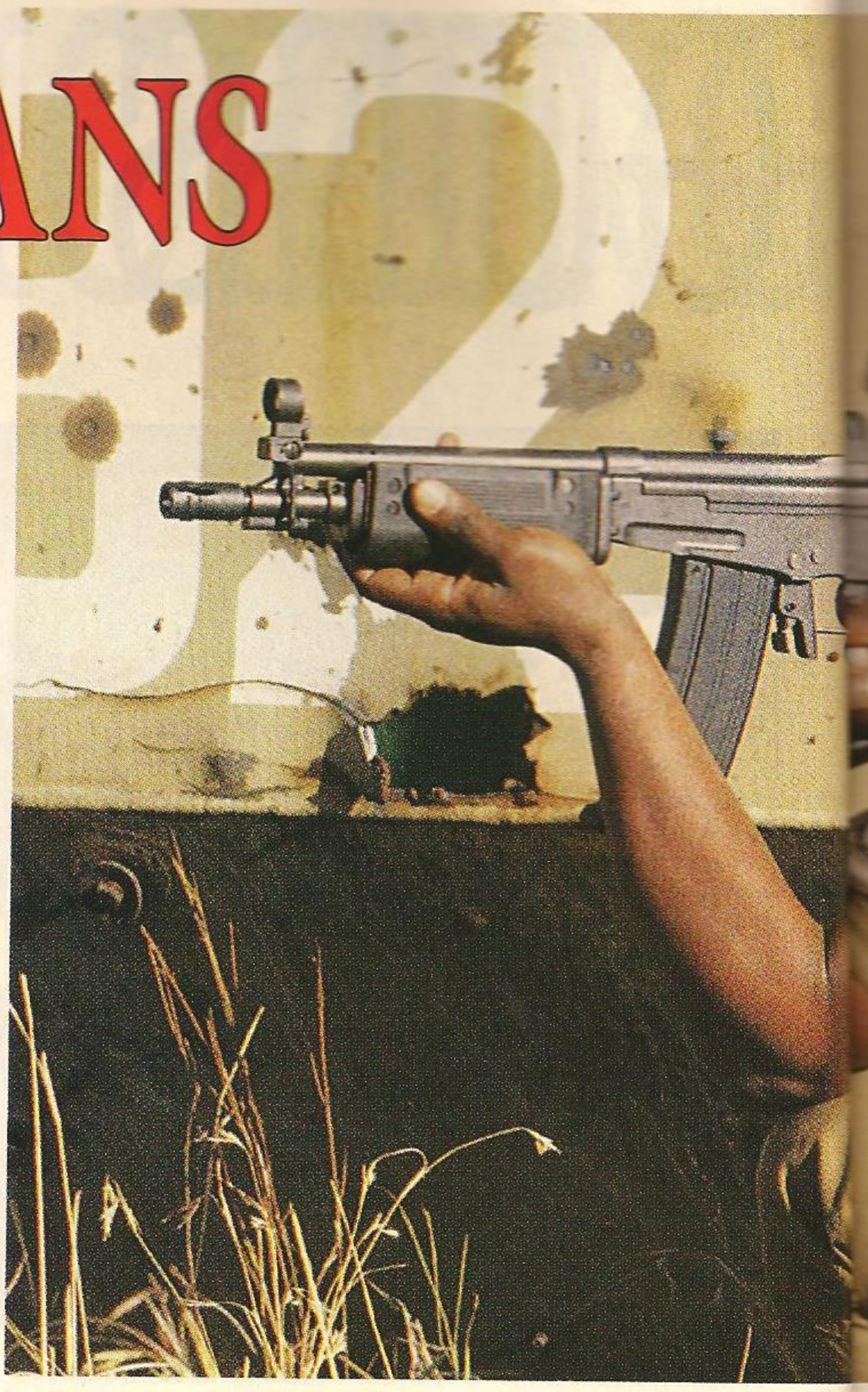
AFRIKAANS AK

by Peter G. Kokalis



Like it or not, the 5.56x45mm cartridge and the millions of infantry rifles chambered for it are going to be with us for a long, long time to come.

The Evil Empire has collapsed. The perceived threat has diminished to such an extent that armed forces throughout the world are faced with budget cuts of unprecedented scale. The U.S. Army has abandoned the Advanced Combat Rifle (ACR) program. Staring at thousands of crates of unissued Kalashnikovs, a once-again united Germany has lost its interest in Heckler & Koch's G11 rifle and its caseless ammunition.

Rifles chambered for the 5.56x45mm NATO round predominate in the West and among NATO client states. More or less equivalent in performance, the 5.45x39mm cartridge and the AK-74 rifle are now standard in the armed forces of the former Soviet Union. While there are still almost 50 million caliber 7.62x39mm Kalashnikovs spread out over the planet in one cache or another, infantry rifles chambered for standard-size .30 caliber cartridges such as 7.62x51mm NATO or .30-06 will never again be fielded on the battlefield in anything other than auxiliary roles.

Only three modern assault rifles have been tested and proven worthy in the arena of the battlefield: the M16 series, the Kalashnikov and the R4/Galil. South Africa's R4 and Israel's Galil are nothing more, or less, than caliber 5.56x45mm NATO, highly modified variants of the third model AK-47. Early Israeli Galils were, in fact, fabricated by IMI (Israel Military Industries) using Finnish Valmet M62 receivers with barrels machined from Colt M16 barrel blanks. An altered Stoner 63 magazine was incorporated, along with an FN FAL-type side-folding stock.

When the South African Defense Force (SADF) adopted the R4 (a product-improved Galil) more than a decade ago as their standard-issue service rifle, they selected a weapon more than sufficiently bloodied by Israel's many wars of survival. Rugged, reliable and considerably more accurate than the caliber 7.62x39mm Kalashnikov series, the R4 can be faulted only by virtue of its somewhat excessive weight. Yet the South Africans managed to substantially improve what was an already excellent rifle.

South African R4 rifles do not employ the pinned-and-riveted, stamped sheet-metal receiver of the AKM series. Their receivers are manufactured from a heavy milled forging. In addition, they do not utilize the usual Kalashnikov barrel-extension unit for lockup of the bolt. The bolt lugs lock into recesses milled into the receiver body itself. All of this is supposed to provide a more substantial heat sink to disperse heat more rapidly and reduce the possibility of a cook-off when the weapon is employed in the squad automatic role.

Method Of Operation

The R4's method of operation remains identical to the Kalashnikov's. It fires from the closed-bolt position and is gas-operated without an adjustable regulator.

When the trigger is pulled, the hammer drives the firing pin forward to ignite the primer. After ignition of the primer, a portion of the propellant gases migrates into the 1.8mm-diameter vent, tapped at a 30-degree angle to the gas block which is pinned to the barrel. The gas enters the cylinder (to which a small spring has been attached to secure its retention during reassembly) and drives the piston rearward.

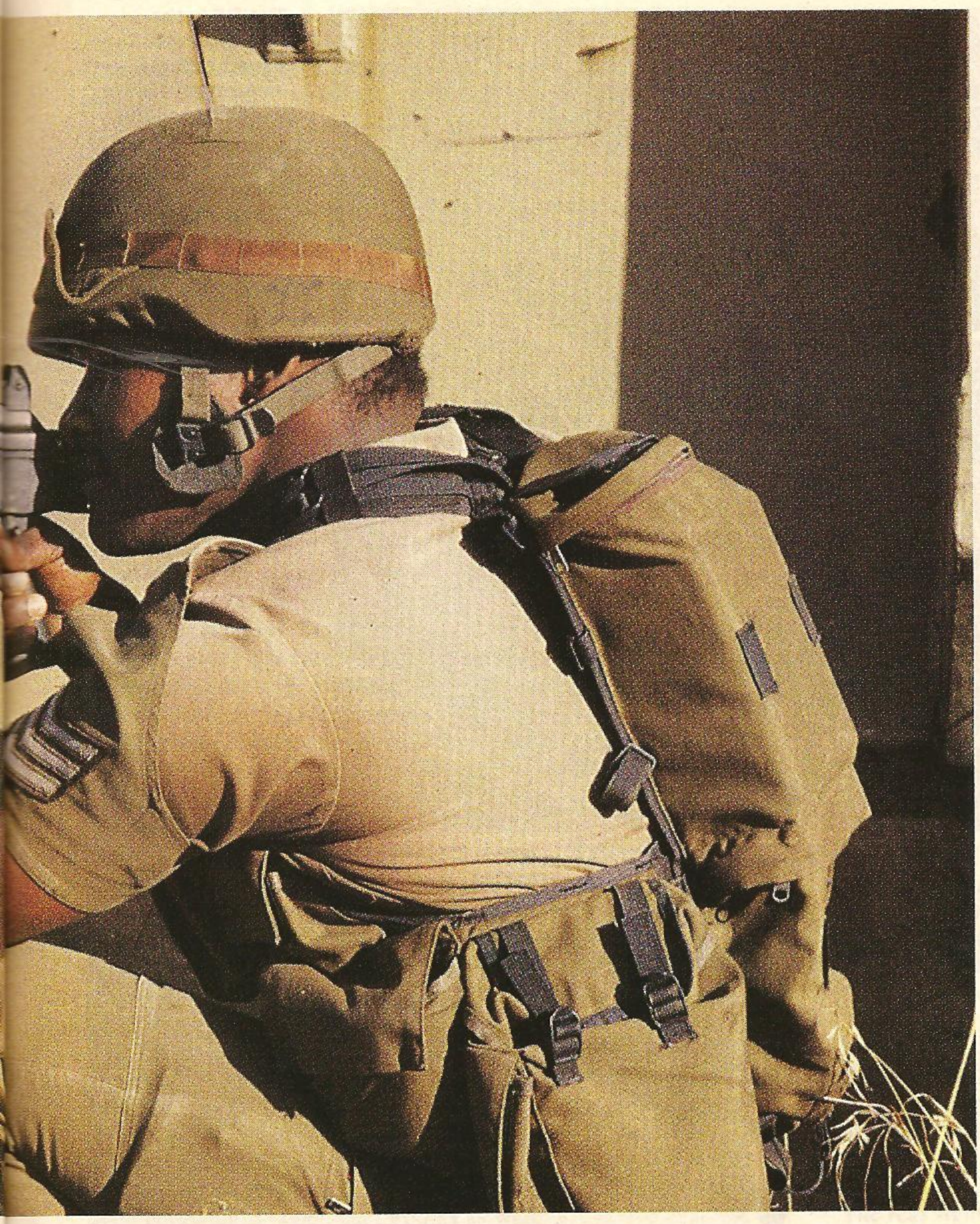
The piston is hard-chrome-plated for ease of maintenance. It is also notched to provide a reduced bearing surface and permit excess gas blow-by. The bolt carrier is permanently attached to the piston. After a short amount of free travel, during which time the gas pressure drops to a safe level, the cam slot engages the bolt's cam pin and the bolt is rotated and unlocked as the carrier moves rearward.

Primary extraction occurs as the bolt is rotated, and thus a massive Kalashnikov-type extractor claw is not required. Empty-case ejection is typically violent. The cases are severely dented by the ejector and thrown to the right and front by as much as 40 feet. At this time, the recoil spring is compressed and its return energy drives the carrier forward to strip a round from the magazine and chamber it.

The Galil uses only one spring for both the trigger and hammer. The R4 rifle has two separate springs for these components. They are made of multi-strand cable for strength and durability. Unlike that of the Galil, the R4 trigger has two holes for the spring to hook into. The trigger and sear springs are conventional coil types.

To inhibit breakage, the R4 trigger sear has a wider tail than that of the Galil. Like other Kalashnikov-system rifles, the trigger

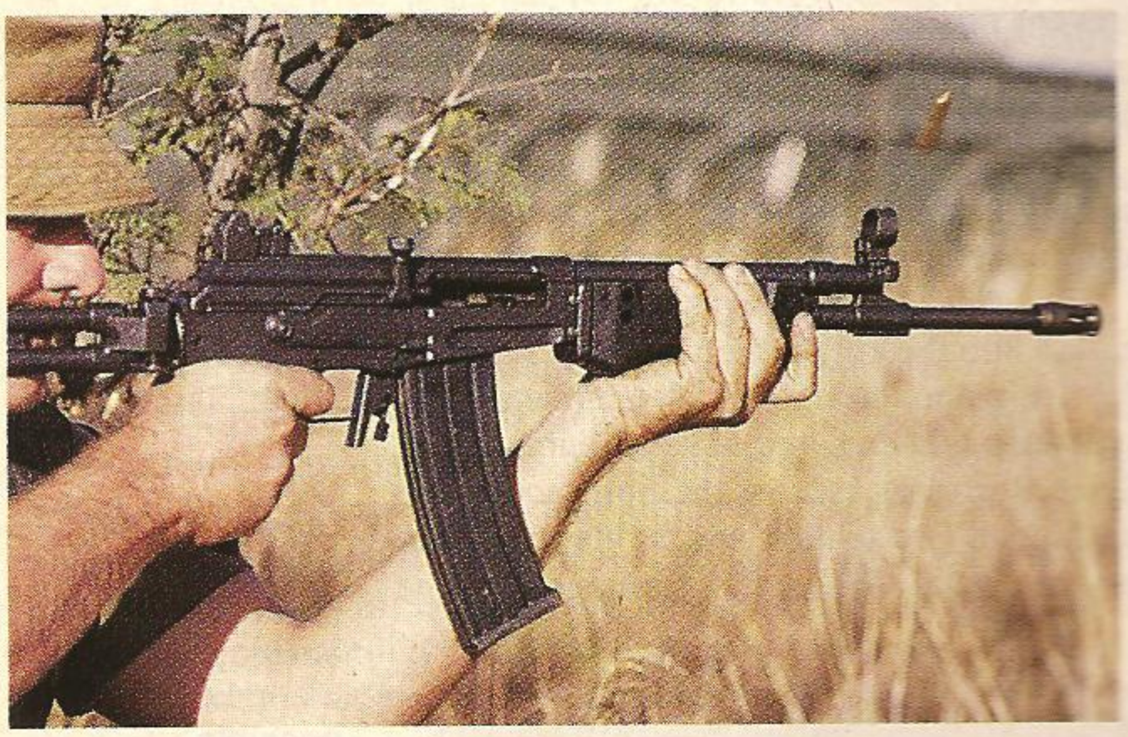
South African R4 Series—Leading-Edge Kalashnicopy



Sgt. Zulu of 115 SAI Battalion fires his issue R4 rifle equipped with the lightweight, 35-round synthetic magazine. The R4 scores high marks in both hit probability and target acquisition when employed by experienced and properly trained operators. Photo: Peter G. Kokalis

mechanism is that first used in the U.S. M1 Garand rifle.

The R4's right-side selector lever is the same stamped sheet-metal bar common to all Kalashnikov-type rifles. It is objectionably noisy when manipulated, unless carefully bent away from the receiver notches by an experienced armorer. The top position ("S") is safe, where the trigger is blocked and the bolt can be retracted only far enough to inspect for a chambered round. The center position ("A") will produce full-auto fire. The bottom position ("R") will provide semiautomatic fire. There is also a smaller selector lever on the left side, intended to be manipulated by the thumb of the firing hand.



The R8 carbine has a 15.6-inch barrel. It has no bipod, but its barrel has been fitted with a steel bushing to accept the South African R1 (FN FAL) tubular bayonet. Photo: Peter G. Kokalis

Two sears control the firing mechanism, the trigger sear and an auto-safety sear. In full-auto fire, the trigger sear is held back and only the first round of the burst is fired off this rear sear. Subsequently, the bolt carrier moves rearward and rolls the hammer over. The auto-safety sear continues to hold the hammer back until the bolt carrier is fully forward again, at which time it trips the auto-safety sear and the hammer rotates to fire another round. Thus, after the first round the trigger sear is deactivated entirely from control on the hammer. Releasing the trigger will catch the hammer on the trigger sear once more. In semiautomatic fire, no pressure is placed on the trigger sear, which is free to catch the hammer each time it is rolled back by the bolt carrier.

Like all Kalashnikovs, the Israeli Galil is not fitted with a spring-loaded firing pin. If the cartridge primers are just slightly too sensitive, the danger of a slam-fire, or premature ignition, is a real possibility. Because of the firing pin's unchecked forward momentum, and because after several thousand rounds its retaining pin initiated a burr on the notched side of the pin, the South

The R7 is the heavy-barrel, squad-automatic version of the R4 series. It weighs 11.2 pounds, empty, and is equipped with a bipod and Galil-type carrying handle. Photo: Peter G. Kokalis

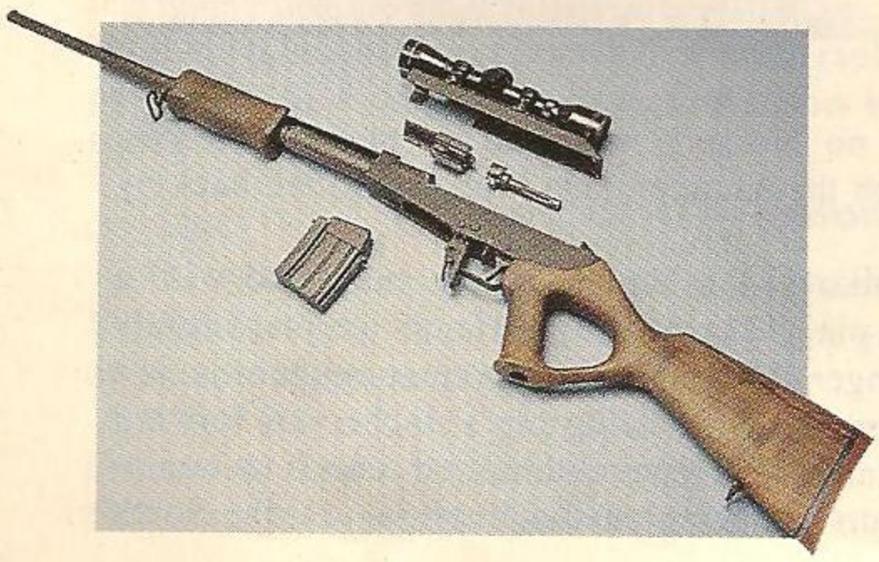
Africans began to experience occasional so-called "ghost shots."

Firing pin redesign efforts at LIW (Lyttelton Ingenieurswerke, Dept. SOF, 368 Selborne Ave., Lyttelton, P.O. Box 7710, Pretoria 0001, Republic of South Africa; phone: 27-12-620-2103; fax: 27-12-620-2407), where the R4 rifle is produced, centered around four requirements. First, the firing pin had to be retained in a rearward position until breech locking was completed. Second, the firing pin had to be prevented from slamming against its retaining pin. Third, the firing pin needed adaptation to prevent misfires ("light hits") without losing additional hammer energy. And finally, the solution had to be a retrofit, not a totally new bolt design.

Firing pin springs were added, but they failed to solve the burring problem. Altering the cam action was attempted and this also proved to be an unsatisfactory answer.

The final solution was ingenious and simple. A recess was milled into the tail of the bolt and a small hole drilled at the end of the firing pin, through which a pin was installed that retains both a synthetic bushing and a steel flat washer. Since it presses against the bolt recess, the bushing is pre-loaded and holds the firing pin rearward. When the hammer hits the firing pin, the bushing collapses into the firing pin's fluted areas and the firing pin moves forward to strike the primer. It was eventually discovered that a completely fluted firing pin was unnecessary; R4 firing pins are now only partially fluted (to permit propellant gases to blow away debris).

Unusual factory cutaway of the R4. Photo: courtesy LIW



Ultra-short R6 carbine. To reduce the envelope to minimum possible dimensions, the gas block was moved rearward as far as possible and both the piston and gas tube shortened. Photo: courtesy LIW

Magazines, Bipods & Pistol Grips

Galil 35-round magazines are sturdy and far more reliable than M16 magazines, but, as they are fabricated with seven steel components, far too heavy. LIW designed a synthetic 35-round magazine for the R4 which was adopted by the SADF about five years ago. Lighter and cheaper than steel magazines, original specifications called for a disposable unit, but the magazine proved to be so durable that this requirement was abandoned. Tests indicate an endurance life of more than 20,000 rounds.

Containing only four components (a steel follower spring and nylon follower, floorplate and body), the body is a one-piece injection molding. The follower ends are closed to inhibit the accumulation of debris. Using international symbols, the month and year of production appear on the magazine body. Production rate is one body per minute, per mold, at 50% the cost of a steel magazine. It will eventually replace all steel magazines in the SADF, including the less than reliable 50-round magazine.

More durable than steel, and just as reliable, this nylon magazine can absorb tremendous shock without damage. Its strength and drop tests surpass steel and, of course, it's not susceptible to

corrosion. Impervious to all commonly encountered cleaning fluids. LIW's magazine has successfully passed accelerated ultraviolet tests (five years of exposure lying on a steel plate on LIW's roof) with only slight discoloration. Cold weather tests have been conducted without failure of any kind.

LIW's nylon magazine will permit troops to increase their ammunition load and should appeal to all armies fielding the Galil series of rifles.

More Magazine Info

The all-steel 50-round magazine is still encountered in the SADF and remains popular with the troops — especially those operating from Armored Fighting Vehicles (AFVs) — as it presumably provides more "firepower," whatever that means. It is not reliable. In my experience, staggered-column rifle and submachine gun magazines of a capacity greater than about 36 rounds are invariably equipped with follower springs that provide either too much stripping pressure when the magazine is fully loaded (this will drop the bolt's forward velocity and produce light hits on the primer) or not enough stripping pressure when only a few rounds remain (this will induce "bolt-over-base" feeding stoppages). Furthermore, it is almost impossible to fire from the prone position when extended-capacity magazines are employed.

A 12-round magazine, color-coded with white stripes is available, blocked to accept only crimped ballistite (blank) cartridges for launching rifle grenades. Another special-purpose magazine is that provided with an insert to accept .22 LR cartridges for a rimfire conversion kit, intended to reduce the cost of training.

The R4's magazine catch/release latch is of the flapper type, similar to the Kalashnikov. The front of the trigger guard serves as a shroud to protect the latch from accidental release of the magazine. Loaded magazines must be inserted by engaging a projection on the magazine's front into a recess at the front of the magazine-well, then rotating the magazine back to lock into the spring-loaded catch/release.

One especially useful accessory issued with the R4 is the sturdy, rigid bipod attached to the gas block. It can be used as a wire cutter and to open beer bottles as well.

Some believe that bipods on infantry rifles adversely affect accuracy potential. If attached (like those for the M16) directly to the barrel, it's possible that a bipod might disturb the barrel's harmonics. However, the R4 bipod is not attached to the barrel. More important, at long ranges the point of impact might be slightly altered by the use of a bipod, but the vast majority of enemy contacts occur at distances of 100 meters or less, and at that range no change in the point of impact can be detected. When firing from the prone position under stress, the use of a bipod as a firing platform will only increase hit probability.

The R4's buttstock has been lengthened and is fabricated from reinforced synthetic material, instead of the aluminum tubing found on the Galil. The butt-joint was also redesigned and a polyurethane buffer was added. The Galil ARM's wooden handguards have been replaced by a similar synthetic compound. In both instances the strength and durability of these components have been significantly enhanced.

The Galil's synthetic pistol grip has been retained and it is one of the very best ever put on an assault rifle. It is more than just reminiscent of that encountered on the Hungarian AKM/ADM-65 series. Of more than adequate length, with a well-defined bottom flare to prevent the hand from slipping, the pistol grip has been mounted to the receiver at an excellent grip-angle.

No less than 15 of the R4's components are investment castings produced by Telcast Engineering Works (Pty.) Ltd., a South African company that specializes in sand and gravity die-casting, precision forging, and investment and vacuum casting. When properly utilized, investment-cast parts are more cost-effective and less labor-intensive than traditional milled forgings.

There are a number of other small, but important, differences between the South African R4 and the Israeli Galil. The rifle-grenade retaining spring on the R4 has been modified to inhibit fouling and now lies completely within the barrel groove. There is a shoulder on front of the R4's gas tube to prevent the handguard disassembly lever from moving forward during firing (In addition, the handguard holder was altered to prevent incorrect installation of the handguard, while the handguard locking lever was chamfered and is now easier to rotate past the gas block.). The Galil's carrying handle has been removed.

The R4's bolt-retracting handle has a machined configuration. It is not bent over as is the Galil's. Both are upright to allow cocking with either hand — a useful feature. The last East German Kalashnikovs to be produced featured turned-up cocking handles, undoubtedly to provide this ability.

For cost-effective purposes, the R4's recoil-spring retaining ring can be installed in only one orientation. The rear end of the Galil's recoil-spring guide rod, which serves as a retainer for the sheet-metal receiver cover, is somewhat extended (from that of the AK-47/AKM) to ease disassembly and to lock the cover more securely to the receiver body. This projection on the end of the guide rod was extended even further on the R4 to prevent the receiver cover from coming off when firing grenades. The guide rod tube was also lengthened for the same reason.

Even relatively low-power scopes serve only to restrict the soldier's field of view and retard the acquisition of moving targets at the close ranges where combat mostly occurs.

This added rigidity is also important, as the rear sight is mounted on the receiver cover. While no less secure than its attachment to the gas cylinder on the Finnish Valmet M71, it does not provide the rigidity offered by the gas-block-mounted rear sights of the other rifles in the Kalashnikov series. The trade-off is a longer sight radius.

Sight Solutions

The rear sight is a flip-up, peep type with 300- and 500-meter apertures. The post-type front sight (somewhat thinner than that of the Galil) can be adjusted for elevation and windage zero. Adjustments are by means of a tool usually issued only to cadre. Windage adjustment is achieved by loosening and tightening two opposing screws which move the entire front-sight assembly in its dovetail on top of the gas block. The diameter of the front sight hood (increased over that of the Galil) is such that it forms an additional aiming circle just within the rear aperture to further assist sight alignment and speed target acquisition.

The R4 is equipped with encapsulated tritium night sights set for target engagement at 200 meters. To use at dusk or night, the front tritium-sight assembly is folded up to expose a vertical bar, which is aligned between two rear luminous dots also mounted on a hinged assembly in front of the rear sight. When the rear tritium sight is flipped up for use, the rear peep sights must be placed in an offset position midway between the two apertures.

The dovetail for a scope side-mount, found on the left side of the Galil's receiver, has been omitted on the R4. Correctly so, in my opinion, as optical sights belong on dedicated military sniper rifles only. Even relatively low-power scopes serve only to restrict the soldier's field of view and retard the acquisition of moving targets at the close ranges where combat mostly occurs.

Other changes: white dots instead of bars on the receiver below "SAR" on the left-hand selector. In the British Commonwealth manner, the serial number is on the R4's barrel instead of the receiver. The height of the bullet guide behind the chamber was increased. Some holes were removed from the gas block.

Finally, the Galil has a conventional baked-enamel finish over

R4 RIFLE SERIES SPECIFICATIONS

Caliber: ..... 5.56x45mm NATO.

Operation: ..... Locked breech with rotary bolt; gas-operated (except for slide-action Vektor H5); selective-fire capability (except for Vektor H5, LM4 and LM5); fires from the closed-bolt position.

Feed: ..... 35-round synthetic, 12-round ballistite and 35- and 50-round steel, detachable staggered-column, two-position-feed, box-type magazines. 5- and 12-round magazines for Vektor H5.

Weight, empty ..... R4: 9.4 pounds; R5: 8 pounds; R6: 8.1 pounds; R7: 11.2 pounds; R8: 8.3 pounds; Vektor H5: 10 pounds (complete with scope).

Length: ..... Stock folded — R4: 30.8 inches; R5: 24.5 inches. Vektor H5, overall: 43.2 inches.

Barrel: ..... Six-groove with a right-hand twist of one turn in 12 inches for the M193-type ball projectile.

Barrel length: ..... R4/LM4: 18.4 inches; R5/LM5: 13.3 inches; R6: 11.4 inches; R7: 20.3 inches; R8: 15.6 inches; Vektor H5: 22.4 inches.

Sights: ..... Flip-up, peep-type rear sight with 300- and 500-meter apertures; post-type front sight with protective hood can be adjusted for both windage and elevation zero. Also equipped with flip-up, encapsulated-tritium night sights; Vektor H5 issued with 4x32mm wide-angle optical sight.

Finish: ..... Molybdenum paint of the dry-film lubricant type — extremely tough and both corrosion-resistant and high-temperature-resistant — baked over the exterior of steel components.

Manufacturer: ..... LIW — Dept. SOF, 368 Selborne Ave., Lyttelton, P.O. Box 7710, Pretoria 0001, Republic of South Africa; phone: 27-12-620-2103; fax: 27-12-620-2407.

T&E summary: ..... High accuracy potential. Heavy. Felt recoil virtually non-existent. Very little muzzle rise when burst-fire is limited to 2 or 3 shots. Excellent hit probability and rapid target acquisition when employed by experienced and properly trained operators. Designed with the assistance of highly experienced end users. Extremely well-executed.

phosphate. A molybdenum paint of the dry-film lubricant type, which is extremely tough and both corrosion- and high-temperature-resistant, has been baked over the exterior of the R4's steel components.

All of which merely demonstrates that even the best weapons systems can be improved when exposed to some forced ingenuity and that most ultimate of all test beds — combat.

There are presently no less than eight variants in the R4 series. All have six-groove barrels with right-hand twists of one turn in 12 inches for the M193-type ball projectile. The SADF is currently evaluating the prospect of converting to Belgian SS109-type (U.S. M855) ball ammunition, which will require a faster twist (at least 1:9 inches). The R4, as described above, has a barrel length of 18.4 inches and weighs 9.4 pounds, empty. Next to be fielded was the R5, which is in service with the South African air force and marines. More or less equivalent to the Israeli SAR, the R5 has a barrel length of 13.3 inches, weighs about 8 pounds and has no bipod. The cyclic rate of both of these weapons in the full-auto mode ranges from 600 to 700 rpm.

The R8 is, in essence, an R5 with a longer barrel (15.6 inches). Like the R5, it has no bipod. It weighs 8.3 pounds, empty. Its barrel has been fitted with a steel bushing to accept the South African R1 (FN FAL) tubular bayonet. This bushing can be attached to all rifles in the R4 series, except the R6 and R7.

Weighing 8.1 pounds, empty, the R6 is an ultra-short carbine featuring a barrel length of only 11.4 inches. This drops the muzzle velocity to only 2,700 fps. The gas block was moved rearward as far as possible and both the piston and gas tube were shortened.

From Variety to Vektor

The R6 barrel's gas port diameter is that of the R5. The cyclic rate is only 585 rpm. When the muzzle is placed close to the gas block, the time/pressure curve is shortened and there is less gas available to drive the reciprocating parts rearward. As a consequence, chopping the barrel of a gas-operated machine gun will invariably lower the cyclic rate. The R6 has a birdcage-type flash suppressor with three vertical slots on its top and none on the bottom (to prevent dust from kicking up when firing in the prone position). Nevertheless, the flash signatures of both the R5 and R6 are objectionable, in my opinion. An even-more-compact bullpup configuration is under development at LIW.

The R7 is a heavy-barrel version with a barrel length of 20.3 inches. This version weighs 11.2 pounds, empty. It is equipped with a bipod and a Galil-type carrying handle. To accommodate the heavy barrel, a new gas block was designed. There is no bayonet lug. Its flash suppressor has two longitudinal slots on top, offset slightly to the left, and eight holes around the circumference, drilled at an angle away from the operator (to direct unburnt propellant granules forward, not to control muzzle jump).

The LM4 and LM5 are semiautomatic-only versions of the R4 and R5, respectively. They have different selector levers and sears from the selective-fire models. A special version of the LM4, without a receiver cut for the auto-safety sear (and not easily convertible to full-auto) has been manufactured for sale to collectors and shooters in Switzerland. Unfortunately, the South African government would not permit LIW to market the LM4/LM5 to civilians in South Africa.

This resulted in the most unusual transmutation of an infantry rifle in the history of military small arms. LIW has managed to successfully turn the gas-operated, selective-fire R4 into a slide-action rifle called the Vektor H5. Vektor is the new military small-arms and commercial division of LIW.

Vektor Vanguard

The Vektor H5's receiver body remains basically the same as that of the R4. The trigger mechanism, sear and bolt are those of the R4. A manual safety has been installed in front of the trigger that blocks both the sear and the trigger. The top part of the bolt carrier has been cut off, and the piston and all gas components removed. A steel block has been added to the receiver to retain the redesigned receiver cover, which is held to this block by an allen-head screw. So that a scope might be securely mounted, the receiver cover has been manufactured from much thicker steel than the sheet-metal cover of the R4.

There is a stud on the top of the bolt carrier which mates with the action arm. A steel tube over the rear end of the barrel contains the action spring which keeps the bolt forward in the locked deposition. A projection at the rear end of the carrier prevents the hammer from striking the firing pin if the action is partially unlocked.

The walnut forearm surrounds an aluminum tube, to which is attached the spring-steel action arm by means of two rivets. This assembly is glued to the forearm. The walnut, thumbhole buttstock

R4 demonstrates its exceptional reliability during the mud portion of environmental testing. Photo: courtesy LIW

Without doubt the most unusual transmutation of an infantry rifle in the history of military small arms, the Vektor H5 is a commercial, slide-action version of the gas-operated, selective-fire R4. Photo: courtesy LIW

has a rubber buttpad and a long swivel on its bottom. Both buttstock and forearm are made by Musgrave. The front sling swivel (an FN FAL type) rides in a groove on the barrel in front of the forearm.

The Vector H5's magazine catch/release is the same as that of the R4. Two magazines are available — a flush-mounted five-round magazine. and one of 12-round capacity that has been modified from the military ballistic magazine.

There is no flash hider nor are there any iron sights on the Vektor H5. A 4x32mm wide-angle scope, complete with ring mounts. is included as standard issue. The reticle pattern is that of conventional cross hairs in the center and thick bars on the sides and top and bottom.

Overall length of the Vektor H5 is 43.2 inches, with a 22.4-inch barrel that has the same rifling-and-twist specifications of the entire R4 series. The weight of this rifle, empty, is a hefty 10 pounds. The standard R4 folding stock and pistol grip can be installed.

As there is no action-release lever, to clear the chamber you must first remove the magazine and then jack the forearm to drive the bolt rearward (the breech is held in the locked position by only the action spring).

I spent a full day test-firing all rifles in the R4 series in the training area (covering more than 45,000 acres) of 115 South African Infantry Battalion. at Murrayhill outside of Pretoria. I have previously. over the period of a decade. fired many thousands of rounds through R4/Galil rifles. They are, by the standards of many. heavy. Partially as a consequence of this, their accuracy potentials are quite high — certainly far beyond the capabilities of other Kalashnikov-type rifles. They also score high marks in both hit probability and target acquisition. when employed by experienced and properly trained operators.

Felt recoil is virtually nonexistent with any rifle in the R4 series, even those with very short barrel lengths. Muzzle rise is barely perceptible if the operator exercises correct fire discipline and fires only two- or three-shot bursts. The cyclic rates of all the selective-fire versions are within reasonable ranges.

Like all LIW products I have encountered, the rifles of the R4 series and their accessories were designed with the assistance of experienced combat-user input (the SADF) and are extremely well-executed. All of the selective-fire versions of the R4 series remain fine examples of the qualities one should look for in a modern infantry rifle.

Wound Ballistics

A great deal of misinformation has been published about the reasons for the effectiveness of the M193 5.56x45mm cartridge for which these rifles are chambered. The large permanent cavity produced by the 55-grain, boat-tailed M193 bullet is primarily a consequence of bullet fragmentation. As long as this FMJ (Full Metal Jacket) bullet travels point-forward, its wound track remains small and there is little tissue damage.

However, after from 2 to 6 inches of penetration, the M193 projectile will yaw to 90 degrees, flatten and break apart at the cannelure (crimping groove). The bullet point remains as a flattened triangular section, retaining about 60% of the original bullet weight and penetrating about 13 inches in soft tissue. That portion to the rear of the cannelure breaks into numerous fragments that penetrate up to 3 inches radially away from the main wound track (unlike those of most fragmenting handgun projectiles, which tend to remain close to the permanent cavity). These multiple fragments perforate and weaken tissue.

Tissue between two perforations is often completely detached when subsequently subjected to the sudden stretch of temporary cavitation. Weakened tissue may be split by stretch that would otherwise be absorbed by the tissue's elasticity. There is a direct correlation between the bullet's velocity and the fragmentation pattern. At a range of 100 yards, the M193 projectile generally breaks into two large fragments. At ranges of more than 200 yards, the bullet flattens somewhat and only a few small fragments squeeze out of the base. If this bullet passes through an arm or leg without striking bone before it yaws and fragments, the damage will be minimal.

There has been a great deal of speculation concerning the effectiveness of the U.S. M855 (similar to the Belgian SS109)

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round. It weighs 62 grains and contains a hardened-steel penetrator frontal core, with a lead base encased in a copper alloy jacket.

Critics have stated that the M855's lethality was reduced because a faster rifling twist of one turn in 7 inches (1:7") was selected for the U.S. M16A2 in order to stabilize the M8566 tracer round with its much longer Belgian L110 projectile. This same argument was presented when the M16's original barrel twist of 1:14" was changed to 1:12" more than 30 years ago. Once again, there is confusion between stability in flight and yawing in living tissue. One does not necessarily follow as a consequence of the other. In fact, at ranges up to 200 yards and somewhat beyond, the M855 bullet's performance in the human body essentially duplicates that of the older M193 round and actually produces slightly increased fragmentation.

It is true that firing M855 ammo in rifles with a barrel twist of 1:12" will result in severe yawing (or "key-holding") of the projectile in flight — to such an extent that at even very close ranges the weapon's accuracy potential is reduced to unacceptable levels.