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**FIREARMS  
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## The TAR-21

**See Page 23**

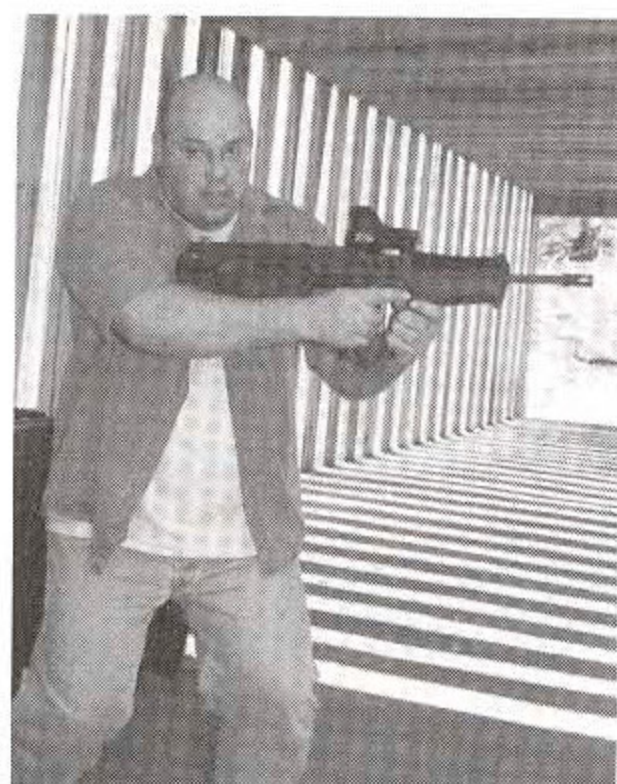
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-  **PMA READER SURVEY**
  -  **SURVIVAL ORIENTED POLICE SHOOTING**
  -  **AIS PRISIM TRAINING SIMULATOR**



# Israel Military Industries' Newest Addition

# The TAR-21

By Mike Conti



Israeli operator holding TAR-21.

Israel Military Industries Ltd. (IMI) is about to unveil the newest addition to its Small Arms Division line of products. Designated as the TAR-21, this bullpup-configured, selective-fire assault rifle is intended for use by

members of the military and police industries. During a recent trip to Israel, I had an opportunity to take a look at one of the final prototypes and put it through some tests. I found the TAR-21 to be a compact, solidly built, and extremely well designed rifle that is sure to attract a loyal following among professional soldiers and law enforcement officers throughout the world.

## BACKGROUND

IMI's interest in developing the TAR-21 was initiated when they were tasked with a considerable mission: to design a new personal weapon system that would replace both the 5.56 mm Galil and M-16 rifles, and be issued by members of the Israel Defense Forces (IDF) for years to come. The vital importance of their task was clear to both the company's executives and members of the engineering team, most of whom had served (or continue to serve) in the IDF. Given the political and military realities of that region, they all realized that the security of their country could very well depend on the performance of the new rifles.

Motivated by this knowledge, the development team chose a unique approach. Instead of adhering to the usual sequence of weapon design, prototype development, field testing, and analysis of feedback from the troops, the IMI engineers went directly to the troops first, and asked them to describe the characteristics they desired in a battle rifle. Among those polled for responses were recruits in basic training and soldiers on both active and reserve duty with infantry, armor, and special operations units. The information that was gathered was then collated and a profile of the troops' ideal rifle emerged. A review of the desired attributes will surprise no one who has ever car-

ried a rifle through rough terrain for any length of time.

First, the ideal service rifle would be lightweight, accurate, and robust. It would also be easy to operate under conditions of daylight and darkness. It would be easy to take apart and clean, and wouldn't have any small springs or pins that could fall out and disappear when cleaning it under field conditions. It would also have a reliable and flexible sighting system that could easily adapt to various environments, conditions, and uses.

Using the profile as a guide, the engineers fired up their computers and set to work. When the smoke cleared, they had identified the bullpup design as the ideal configuration on which to base their newest weapon system. After a working prototype had been produced and tested, 95 sample rifles were put into the

hands of IDF soldiers for review and feedback. Again, those chosen were selected from a broad cross-section of troops at various stages of their training and development. According to IMI, the results from all levels were overwhelmingly positive. Recruits undergoing basic rifle



The TAR-21 Bullpup. (Right-side view). Heavy emphasis on the human engineering of the weapon is evident in the placement and design of the control levers. All were in easy reach when holding the weapon in the ready position. Magazine release, trigger, and slide release lever are designed for ambidextrous access. Charging (cocking) handle, selector lever, and ejection port can be quickly changed over for left-handed shooters. (IMI Photo)



IMI has traditionally experimented with its most successful weapon systems, creating hybrid versions for special-applications. Their approach to the TAR-21 System has been no different. Shown here is the C-TAR-21 (Commando) prototype. Micro (M-TAR-21) and Sniper (S-TAR-21) versions will also be available. (IMI Photo)

marksmanship training fared better with the TAR-21 than either the Galil or M-16. Soldiers assigned to armor and infantry units reportedly favored the shorter, lighter rifle. And operators within the Israeli Special Forces community expressed their satisfaction with the full-size TAR-21 and its more compact variants.

## FORM

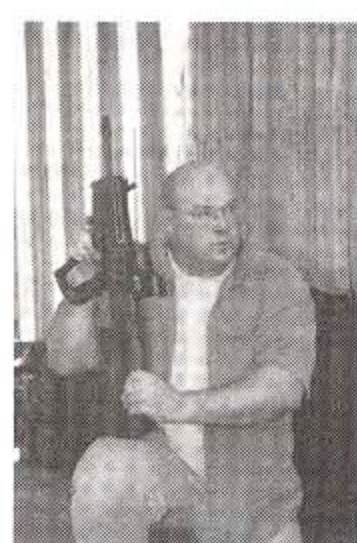
The TAR-21 has the unmistakable appearance of a built-for-business service rifle. It also gives the impression of being much larger than its 28-inch (72 cm) length and 5.5-pound (2.5 kg) weight. This is primarily due to its full-bodied design. The prototype I handled had a lightweight, composite receiver. According to the engineers, this



receiver was crafted from a new blend of materials that are extremely resistant to both hard weather and usage conditions.

Incorporated into the receiver-group are an aluminum insert, trigger rod, safety rod, safety, safety lever, handguard, cocking handle assembly, gas cylinder, butt plate, magazine catch and magazine release lever. The aluminum insert, trigger rod, and safety rod are bonded into the receiver and are not replaceable. The safety rod's function is to prevent the hammer from being

weapon when performing loading, firing, and reloading drills. The weapon uses unmodified M16 magazines which are both reliable and readily available, and it incorporates a last round hold-open mechanism that locks the bolt to the rear when the magazine is empty. The magazine release lever is also set up in such a way that it is truly ambidextrous, yet should not be prone to unintentional activation, as the hands are not in direct contact with it when firing the weapon.



## TAR-21: (Tavor Assault Rifle) Specifications

<b>CALIBER:</b>	.....223 REMINGTON (5.56 mm NATO)
<b>METHOD OF OPERATION:</b>	.....GAS ACTION ON PISTON HEAD
<b>LOCKING SYSTEM:</b>	.....ROTATING BOLT, LOCKING LUG
<b>TYPE OF FIRE:</b>	.....SELECTIVE: SEMI-AUTO & FULL AUTO
<b>MAGAZINE CAPACITY:</b>	.....ANY STANDARD DETACHABLE M16 MAGAZINE
<b>WEIGHT, (EMPTY MAGAZINE, NO SIGHT, NO SLING):</b>	.....5.5 lbs. (2.5 kg)
<b>WEIGHT, COMBAT (W/LOADED 30 ROUND MAGAZINE, MARS SIGHT AND SLING):</b>	.....7.7 lbs. (3.5 kg)
<b>BARREL LENGTH (STANDARD):</b>	.....18 inches (46 cm)
<b>BARREL SPECS:</b>	.....FLOATING, CHROME-PLATED BORE, DETACHABLE
<b>RIFLING:</b>	.....1 Turn in 7", R.H. twist (NATO)
<b>OVERALL LENGTH:</b>	.....28.3 inches (72 cm)
<b>SIGHTS:</b>	.....WILL BE EQUIPPED WITH COMBINATION OPTICAL / IRON SIGHT
<b>COOLING:</b>	.....AIR
<b>CYCLIC RATE:</b>	.....APPROXIMATELY 800 ROUNDS PER MINUTE
<b>STOCKS:</b>	.....COMPOSITE RECEIVER
<b>ACCESSORIES:</b>	.....ELECTRONIC, TELESCOPIC, & IRON SIGHTS; VISIBLE & I.R. LASER SIGHTS; FLASHLIGHT; BIPOD
<b>OPTIONS:</b>	.....READILY ADAPTABLE TO FIRE RIFLE GRENADES; WILL ACCEPT M-203 GRENADE LAUNCHER; COMMANDO, MICRO, AND SNIPER VERSIONS WILL BE AVAILABLE
<b>AVAILABILITY:</b>	.....AFTER OCTOBER 01, 1999
<b>PRICE:</b>	.....NOT AVAILABLE AS OF THIS WRITING

accidentally released when the selector is set to safe.

All of the control levers, including the cocking handle, trigger, selector switch, bolt release lever, and magazine release catch are within easy reach and allow quick manipulation of the

The TAR-21 also employs an ergonomically-friendly, molded handgrip/ trigger guard combination, similar to that of the Steyr AUG. This allows excellent firing-hand placement in relation to the trigger, which, due to the bullpup design, is forward of the





Bolt and firing pin being removed from carrier-group.

rifle's action and magazine. Having the trigger group closer to the front of the rifle also allows for a more balanced and stable hand position when firing the weapon, especially when standing or on the move. Combined with the action-heavy stock, the TAR-21 bullpup shoulder-mounts both quickly and naturally when bringing the weapon up to fire. I also found that the straight-line forestock of the TAR-21 combined with the angled front strap of the hand-grip/trigger guard (IMI refers to this component simply as the handguard), provided a very substantial and ergonomically pleasing forward support-hand gripping position. In addition, the handguard provides room enough in front of the trigger so the weapon may be fired by a shooter wearing cold weather gloves, while adequately protecting the trigger from being pressed unintentionally.

The barrel-group assembly consists of a floating-type barrel, barrel extension, sight base/gas block, and a flash suppressor/recoil compensator. This barrel-group can be

Hammer/sear group shown removed from weapon.



replaced in the field by a first echelon armorer. The barrel subassembly is assembled to the barrel block (aluminum insert) and locked by rotating the barrel

rel gas block.

The TAR-21 is a 5.56 mm NATO (.223 Rem.), gas operated, air cooled, shoulder-fired, magazine fed, selective-fire rifle. It utilizes a straight-line construction. This means that the barrel, bolt, recoil buffer unit and stock are assembled in line, and that the rifle operates in a conventional manner, firing either semi-automatic or

lock pin 180 degrees. The TAR-21 I was provided with was equipped with a red-dot MARS (Multi-purpose Aiming Reflex Sight) sight. This sight was mounted directly on the barrel's gas block. Additional sighting devices are also available and can be easily mounted, thanks to an ingeniously integrated second mounting bracket on top of the receiver to the rear of the bar-

## FUNCTION

When set on the safe mode, both the trigger and hammer are blocked by the hammer pin, preventing the hammer's release, should the weapon be inadvertently dropped.

The TAR-21 is loaded by inserting a fully-loaded M-16 type magazine into the

**In addition, the handguard provides room enough in front of the trigger so the weapon may be fired by a shooter wearing cold weather gloves, while adequately protecting the trigger from being pressed unintentionally.**

magazine well. The magazine is inserted straight in until it locks. The charging handle is then retracted and released. Retracting the handle causes the bolt car-

fully-automatic from a closed bolt. The weapon utilizes a 3-position, rotating selector lever that can be set to safe, semi-automatic and fully-automatic modes.

rier to move back and compress the recoil spring. (The bolt carrier is guided by a rod that locks to the front on the barrel extension, and to the rear on the rear



buffer base. The designers contend that having the bolt carrier guided on a single rod minimizes the area of contact between the bolt carrier and the receiver, and increases the rifle's operational reliability under adverse conditions. In addition, the guide rod prevents the bolt from rotating when the cartridge is being chambered. The bolt carrier is also supported on both sides of its lower edge by the walls of an aluminum insert.) The hammer is also cocked during this operation.

When the charging handle is released, the compressed recoil spring forces the bolt carrier forward. As the carrier-group moves forward, the bolt strips the top round from the magazine and drives it into the chamber. The bolt's forward movement stops once the round is fully seated in the chamber. The bolt carrier, however, continues to move forward, and as it does, a bolt guide that is installed perpendicular to the carrier causes the bolt to rotate until its lugs lock securely, preventing it from inadvertently opening during firing.

To fire the weapon, the selector lever is rotated to either the semi-automatic or fully automatic mode. Depressing the trigger causes the trigger bar to move rearward and activate the sear. The hammer is released, striking the firing pin and firing

the round. The action is cycled by the gas-operated short-stroked piston system. As the pressure drops in the chamber, the carrier is driven back by the piston, unlocking the bolt. The expended shell casing is pulled from the chamber by the extractor. The extractor is

mounted on the bolt at a 15-degree angle relative to the horizontal axis in order to minimize the ejection angle. (This keeps the ejected rounds away from the shooter's face). The spring-loaded ejector, mounted on the opposite side of the extractor, ejects the expended shell cas-

ings at a 45-degree angle to the rear as the carrier-group completes its rearward movement. (The use of a spring-loaded ejector also enables the employment of a left-handed bolt when converting the weapon over for use by a left-handed shooter). Another round is chambered as the carrier is once again driven forward by the compressed recoil spring.

The fire, extract, eject, feed cycle is repeated every time the trigger is depressed while set to the semi-automatic mode, or, if set to the fully-automatic mode, continues until the trigger is released or the magazine is empty. The automatic sear that is used to activate the hammer during automatic firing is engaged by the bolt carrier only after the bolt has been fully locked, thereby ensuring that no firing will occur out of battery. This is critical considering the 5.56 mm NATO round generates chamber pressures of approximately 55,000 pounds-per-square-inch when fired.

## HANDLING AND ACCURACY

The TAR-21 handled extremely well. This is in great part because of the bullpup configuration. As the receiver, bolt, and magazine are all located to the rear, so too is the weapon's center of gravity. This weight distribution translates into a rifle that is especially easy to con-

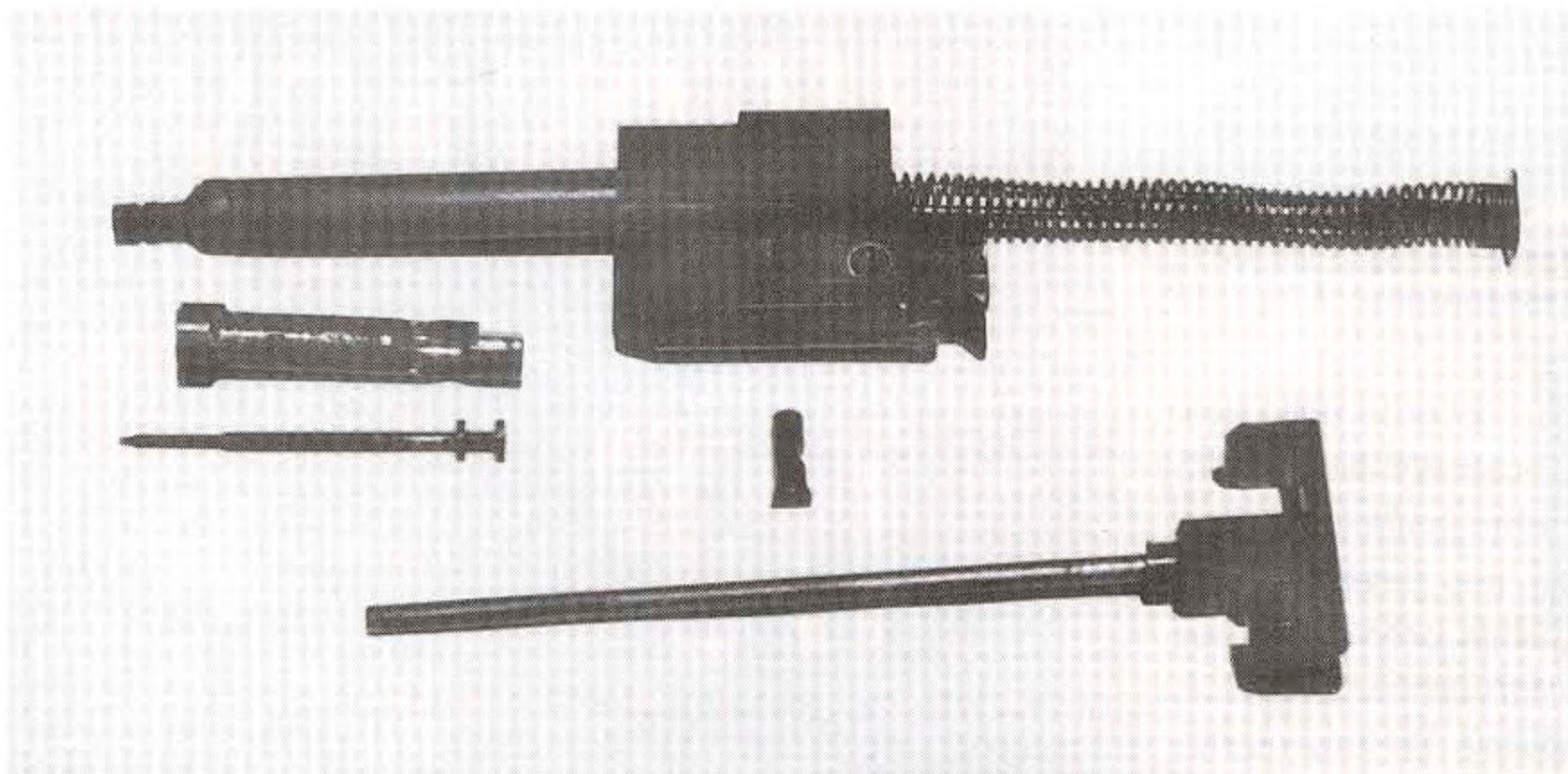
of accuracy. This is possible because the TAR-21 employs an 18 inch (46 cm) barrel with a 1:7" (NATO) rifling twist in its standard duty model, while still possessing a total overall length of only 28 inches (72 cm). This consideration is of utmost importance to those who will be

**This weight distribution translates into a rifle that is especially easy to control when firing multiple shots in semi-automatic or fully automatic modes. Felt recoil is practically non-existent.**

operating in close quarters.

In addition to its shorter length, the TAR-21 also comes up a winner in the weight category, coming in at 5.5 lbs. (2.5 kg) when empty, and a very acceptable 7.7 lbs. (3.5 kg) with a fully loaded 30 round magazine and sling. Comparing that to the weight of the longer Galil and M16 5.56 mm rifles it is intended to replace, it is easy to imagine why many members of the IDF are eagerly awaiting the arrival of the new weapon system. In regard to handling weaknesses, the most obvious tactical shortcoming found in this or any bullpup is discovered when shooting from the side of cover opposite the ejection port. There is, unfortunately, no easy way to do this without exposing the shooter to his own rifle's hot outgoing brass or an adversary's hot incoming lead. As for accuracy, the TAR-21 incorporates a floating barrel that allows it to flex when firing. This feature, generally found in weapons

intended for sniper's use, tends to allow for improved accuracy on the first and follow-up shots. The weapon I fired printed extremely tight deliberate-fire groups at the 25 meter range, and also proved to be a fast snaphooter once I got used to mounting the rifle high enough to proper-



Disassembly of the TAR-21 is extremely simple. Sliding one pin aside allows the butt plate to pivot open. The bolt carrier-group (shown fully field-disassembled here) is then removed for cleaning/maintenance.

trol when firing multiple shots in semi-automatic or fully automatic modes. Felt recoil is practically non-existent. Having the action located further back in the stock also results in a rifle with a shorter overall length than most conventional rifles, though without any attendant loss



ly align my eye with the reticle in the electronic MARS sight. The windage and elevation adjustments on the MARS sight

were easily accessed. On the top strap of the sight itself was an integrated, short-sight-based iron rail and post sight for emergency use should the electronic sight become damaged or otherwise inoperable.

The trigger pull on the weapon I tested was also unusually smooth with very little creep, allowing for a consistent surprise break at final sear engagement. I estimated trigger pull to be around 6.0 lbs. (2.7 kg). The weapon also performed exceptionally well when firing rapid-fire shots in semi-automatic mode as well as



**Retracting the cocking (charging) handle. The MARS sight shown here is mounted directly onto the barrel's gas block. This passive, non-magnifying optical scope sight employs an electronically generated red dot reticle that is superimposed on the image as seen through the scope. A small battery housed within the unit powers the red dot, and the intensity of the dot can be adjusted by a switch to adapt to user preference, target distance, and light conditions. On the top strap of the MARS sight you can see the integrated, short-sight-based iron rail and post sight. This iron sight is suitable only for close-in, emergency use.**



**Depressing the slide release lever allows the bolt to slam home. Unlike the Galil rifle, the TAR-21 incorporates a last round hold-open mechanism.**

when firing controlled bursts and sustained fire on full-auto. This is due to a combination of factors. First, the bullpup design puts most the weapon's weight closer to your body, making it feel lighter. Second, the straight-line design directs the recoil straight back to the shoulder, helping to keep muzzle climb to a minimum. Third, the cyclic rate of fire of approximately 800 rounds per minute is easily managed due to the use of the light

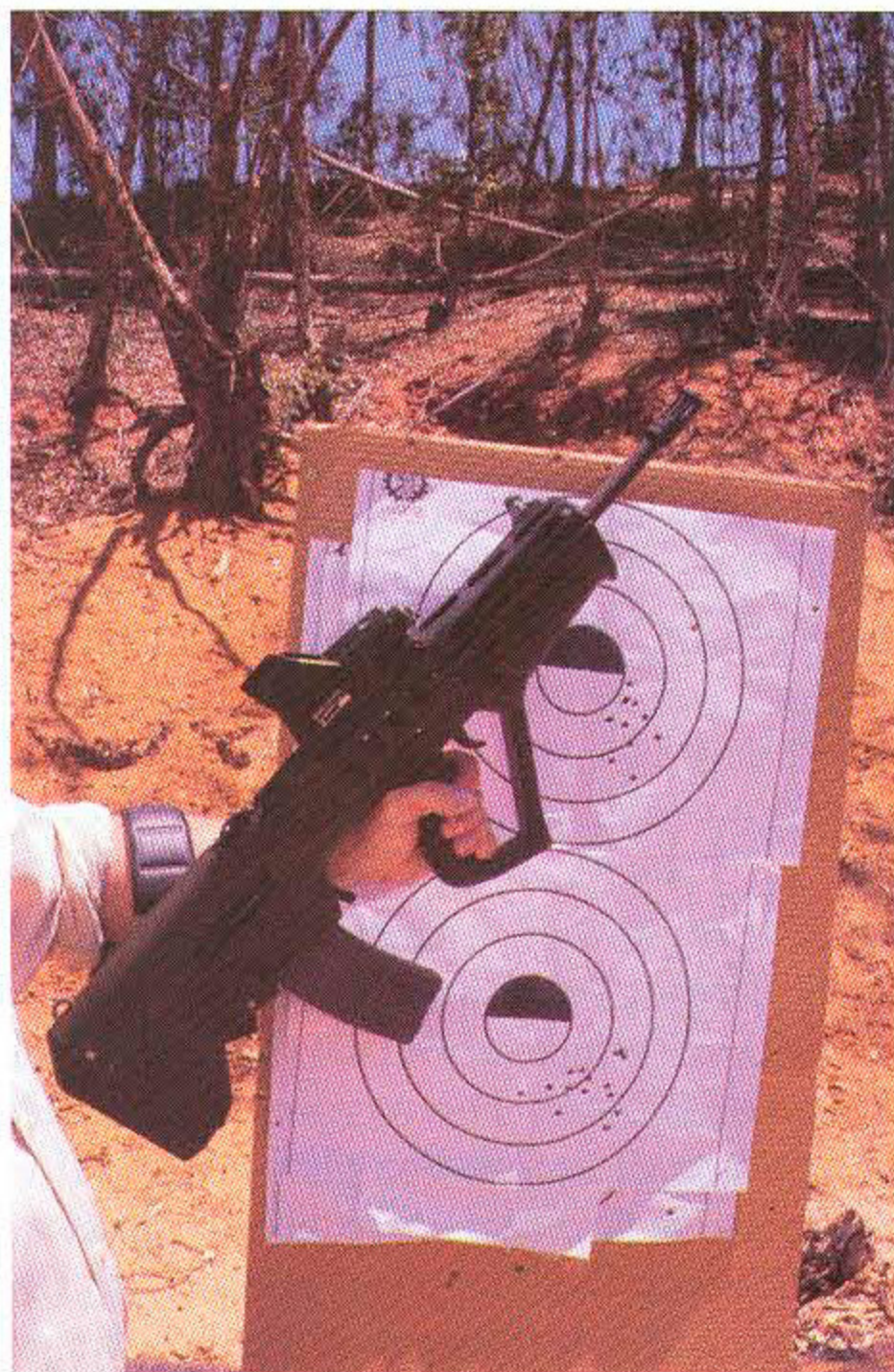


## The TAR-21

recoiling 5.56 mm round.

### SUMMARY

Similar to IMI's superior Galil rifle



line, the TAR-21 is ruggedly built and engineered to be reliable under the harshest of conditions. The quality control in the manufacture of the prototype's internal and external components was also apparent. In addition, it is very obvious that a lot of time was expended in the design/layout phase of the rifle's development, especially in regard to the human engineering aspects. This aspect is driven home when handling, loading, firing, and performing (induced) stoppage clearing drills with the TAR-21.

Though I am most anxious to get my hands on one of the production models, I believe that the TAR-21 weapon system absolutely has the potential to become a

**Authors target on bottom.** Both 12-shot, snapshot pattern groups were fired from 25 meters by two different shooters. Off-center groups due to MARS sight not being zeroed for either shooter prior to firing. Three-shot deliberate fire one-hole group (bottom target, closest to 3 o'clock) achieved from supported firing (kneeling) position. SAMSON FMJ military grade ammunition was used.

mainstay in the military and police industries both in Israel and abroad. The adoption of this versatile weapon for use in the role of law enforcement patrol rifle is only one of many applications for which I believe it to be exceptionally well suited.

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### *About the Author*

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