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Tank Tops and Heavy Metal: Armor's Enduring Appeal on the Modern Middle Eastern Battlefield

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Executive Summary

Far from being a relic of the past, the heavily armored main battle tank is redefining its place on the modern battlefield. From Iraq and Afghanistan to the Palestinian territories, the tank is displaying a new versatility that has once again propelled it to the forefront of ground combat. A renaissance in technology has made the venerable tank not only more lethal and maneuverable, but more survivable as well.

The Middle East continues to serve as the principal proving ground for new armor technology with countries like Egypt, Jordan and Iran engaging in major upgrade programs. The US remains one of the principal tank suppliers to the Arab states, recently announcing that it will provide the latest version of the M1 Abrams tank, the A2, to its allies.

Israel, by contrast, stands at a crossroads in tank acquisition. With its defense budget under increasing strain, there is mounting pressure from the government to terminate production of the Merkava tank. Doing so, however, would have a crippling effect on the nation's defense industrial base and most assuredly on the ability of Israel's military leaders to address the growing threat of urban insurrection now gripping the country.

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It is imperative that the Government commit to an economic rate of Merkava tank production of at least 50 vehicles per year to ensure a viable armor industrial base. Legacy systems should be upgraded, where appropriate, and a robust research and development program for armor maintained.

The Merkava remains an essential part of Israel's export economy, generating income not only from the sale of defense products and services overseas, but from the diffusion of technology into the civilian sector as well.

The advent of more lethal anti-tank weapons, attack aircraft and long range smart weapons has not diminished the value of the tank. Rather, it has emphasized the need for greater survivability and lethality on the modern battlefield. The ability to seize and hold ground will forever remain at the heart of winning strategy. The Middle East Theater is no exception.

As Israel's adversaries continue to improve their offensive systems it is imperative that the Jewish state not forget some of the hard won lessons of its past. Both quality and quantity are both essential components of victory in a war environment characterized by high attrition, beyond visual range engagement and the need for precision strikes. The heavy tank is an answer to each of these requirements, and as such, should remain an effective fighting tool well into the 21st century.



Israeli Merkava Mk2C Main Battle Tank

Source: Mobilixnet

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The tank has long been a staple of combat in the Middle East. It featured prominently in the North African campaign of World War II and in every major clash between Israel and its Arab neighbors since the Jewish state declared its independence in 1948.

Even today, it is the heavily armored main battle tank (MBT) that stands watch along Israel's border with Lebanon and is the first line of support for infantry patrolling the Palestinian territories. Across the Arab World, the tank remains central to war fighting doctrine and the weapon of choice for commanders wishing to seize and hold ground in virtually all battlefield conditions.

Yet despite this record of distinguished service, there are those in the military community who contend that the era of the tank is rapidly fading. They point to dramatic advances in anti-tank guided missiles (ATGMs), improvised explosive devices (IEDs), anti-armor mines, refinements in close air support and the proliferation of unmanned vehicles as evidence that a global revolution in ground combat is now underway.

For many, this means a gradual move away from the large and expensive weapons platforms that have long dominated modern warfare and towards more nimble, less expensive fighting vehicles. What these new systems lack in firepower and protection their designers insist is made up for in stealth, range and operational flexibility.

Even in Great Britain, home of world's first tanks, the Ministry of Defence (MoD) is now reevaluating the place of tanks in the Army's order of battle. With budget cuts looming, the MoD is shifting its focus away from traditional armored platforms and towards an array of multi-role weapons, rapidly deployed forces and improved surveillance systems. According to a recently released White Paper, this could mean the elimination of two armored regiments and nearly one third of the country's heavy armored force, approximately 120 Challenger 2 tanks, over the next several years.¹

The lessons now being learned by Coalition forces in Afghanistan and Iraq will have a significant influence over the way in which military planners assess the future role of the tank. In both wars, heavy armor played a critical role in the initial days of fighting. But as Coalition operations shifted to a policing function, the tank's use as an instrument of urban pacification and civil control diminished. This changed in the Spring of 2004 when major fighting erupted again across Iraq's Sunni triangle in places like Fallujah and ar-Ramadi. Commanders then quickly abandoned their lighter, less secure assault vehicles and turned once again to the heavy tank for protection.²

As technology permits greater lethality to be packaged into ever smaller man-portable systems, the vulnerability of heavy armor unquestionably has increased. Even so, one fundamental truth regarding defense on the battlefield remains unchanged – more is better. In this new and deadlier age of asymmetric warfare, adaptation and technological innovation are the keys to the tank's survival. But it is funding, in ever larger amounts, that will make this evolution possible.

In the race for the high ground the venerable tank could well be one of the first casualties of the modern battlefield or its greatest singular achievement. Most assuredly, it will be in the sands and cities of the Middle East where that judgment will be made.

Modernizing Arab Armor

While some Western military strategists may be predicting the demise of the tank, there is little sign that this prophecy has taken hold in the Arab World. For over a decade, countries like Egypt, Saudi Arabia, Kuwait, and Jordan have worked vigorously to modernize their heavy armored fleets. They have spent billions of dollars acquiring new, state-of-the-art platforms from the foremost tank manufacturers in America and Europe and billions more upgrading their old Soviet equipment with Western technology.

Corresponding improvements in training, maintenance, command and control and air-land battle tactics have given the armored forces of the Arab World a potency they lacked in the past. This is particularly true for Egypt which has significantly improved both the lethality and survivability of its tank force. After many years in the technological wilderness, Egyptian armor is once again emerging as a powerful threat to Israel's security.

Today, the Jewish state finds itself outnumbered 2.3 to 1.0 in the number of heavy tanks fielded by its Arab neighbors. In 2003, Arab tank inventories grew to new levels with the following countries leading the way: Syria: 3,700, Egypt: 3,000, Jordan: 990, Saudi Arabia: 750 and Lebanon: 280.

In any future ground war, Israel's arsenal of approximately 3,900 tanks must contend with a combined Arab force of 8,720 tanks. While many of these consist of older Russian T-72, T-62 and T-55 models found principally in the Syrian arsenal, the region's governments are moving to replace these vehicles with newer systems. Damascus, for instance, is upgrading to the newer Russian T-80 tank.

The Hashemite Kingdom of Jordan has embarked upon a program to expand its fleet of 288 British-made Challenger-1 tanks by an additional 100 vehicles. The turrets will be retrofitted with the L11 medium-pressure 120mm smooth bore gun manufactured by RUAG Land Systems of Switzerland.³ This new gun will give the Al-Hussein, as the Challenger-1 is known in Jordan, the ability to fire depleted uranium (DU) ammunition. This modification will enhance significantly the firepower of the Challenger-1, giving the Kingdom's tank force an accuracy, reach and lethality it has lacked up until now.

Changes are coming as well to the Kingdom's fleet of American M60 tanks. In a three-way partnership between the Raytheon Technical Services Company LLC (RTSC), RUAG and the King Abdullah Design and Development Bureau (KADDB), Jordan will upgrade 100 M60 A1 and A3 MBTs with the Phoenix Level 1 Integrated Fire Control System (IFCS).

According to RUAG, the IFCS will provide the tanks with "second generation FLIR imaging, eyesafe laser ranging and digital ballistic computing in a stabilized and synchronized cannon and sight system".⁴ The tanks also will gain the ability to fire while in motion. An upgrade from the 105mm to the 120mm Compact Tank Gun (CTG) will make Jordan's M60s compatible with the NATO standard.

A final contract awarded by the Kingdom of Jordan to Raytheon in April 2004, for \$64.8 million will complete the upgrade of the entire Jordanian M60 fleet to the IFCS configuration. According to the Raytheon announcement, "this upgrade improves the M60s firepower capability and survivability by offering a significant improvement in first-round hit capability" and "true shoot-on-the-move capability".⁵

The Kingdom of Saudi Arabia may follow Jordan's lead in upgrading its own M60A3 tanks to the Phoenix configuration. This would include not only replacing the current 105mm. gun with a RUAG 120mm. smoothbore model, but enhancing the tank's armor protection as well.

According to recent reports, Saudi officials are now in discussions with Jordan's KADDB over the possibility of incorporating the IFCS into its M-60 tanks. Also under consideration is an engine upgrade to the General Dynamics 950 HP AVDS 1790-6. This would increase the effective range and overall performance of the Saudi M-60 tanks while also enabling them to accommodate the increased weight of a new gun turret. Currently, the Royal Saudi Land Forces operate approximately 150 M-60 A3 tanks in the TTS configuration along with 315 M1A2 Abrams tanks.⁶

Though not an Arab country, the Islamic Republic of Iran fields an armored force of approximately 1,500 tanks. Israeli military planners are keenly aware that this force could one day find itself fighting alongside Arab armies in a confrontation with the Jewish state.

In a move that could signal the emergence of a new political realignment in the Middle East, Iran and Egypt opened up a strategic dialog at the end of 2003. The meeting between the country's two presidents was the first since Tehran broke off relations with Cairo following the signing of its 1979 peace treaty with Israel.

Since coming to power this same year, Iran's religious leaders have been among the most strident opponents of both American and Israeli influence in the region. Tehran maintains a close alliance with Syria and along with Damascus is a principal arms supplier to the Hizbullah guerilla movement battling Israel from bases inside of Lebanon.

In the 1990s Iran joined Israel and Egypt as one of only three countries in the Middle East capable of producing its own armored vehicle. While the Zolfaqar light tank is no match for Israeli anti-armor weaponry, it does add to the numerical advantage in armor already enjoyed by Jerusalem's adversaries. The tank incorporates a laser-guided targeting system and is reputed to be "lighter and more maneuverable" than earlier models.⁷

When planning the country's future defense requirements, Israeli military planners must consider the full range of capabilities that could be amassed against the Jewish state.

For Israel, though, the real danger lies in pace of the Iranian military build-up in recent years and their increasing ability to weaponize and deliver unconventional arms. According recent estimates, between 2000 and 2001 Teheran increased its defense budget by upwards of 50%.⁸ In addition to the acquisition of a broad range of modern battlefield systems, Iran appears also to be seeking a first strike nuclear capability that could soon be directed against Israel. Military observers believe that Iran already has substantial stocks of chemical and biological weapons at its disposal.

What Iran lacks in offensive armor capability is offset, in part, by its growing ability to neutralize its opponents land systems through the first use of unconventional weapons.

The Growing Egyptian Threat

With a fielded force of 420,000 soldiers, Egypt has one of the largest and most professional standing armies in the Middle East. Equipped with some of the region's most modern weaponry, it also poses the greatest conventional threat to Israel of any Arab state. This danger continues to grow as Cairo pursues an ambitious program of rearmament unprecedented in its recent history. Heavy Armor and systems to defeat heavy armor are key components of Egypt's new offensive military posture.

The centerpiece of Egypt's armored force is the American-made M1-A1 main battle tank. Cairo began integrating the M1 Abrams into its military strategy in 1988 following the construction of Tank Assembly Plant 200 in Helwan just outside of Cairo. At a cost of about \$1 billion, this plant was paid for largely with US foreign assistance dollars.

The M1 is produced in Egypt under a licensed co-production agreement with General Dynamics Land Systems (GDLS). About 60% of each Egyptian M1 is manufactured by GDLS at plants in the US. The components then are shipped to Egypt in kits for final assembly and testing. The remaining 40% of each vehicle is produced locally in Egypt.

In a little over a decade, the Helwan tank plant has spawned a vast network of local factories that now are capable of fabricating many of the parts needed for the repair and maintenance of the country's armored fleet. This has dramatically improved the Army's field readiness while strengthening Egypt's overall military production base. The country's National Organization for Military Production now oversees 16 industrial sites.⁹

Following the production of the first 555 tanks begun in 1991, Cairo authorized additional orders. The latest of these came in October 2003, with the approval by the Pentagon of 125 M1A1 tank kits for \$920 million. A full spare parts and training package also was included in the deal.¹⁰ This brings to 880 the number of Abrams American tanks now in the Egyptian arsenal.

Plans call for a total of 1,500 M1s to be produced and fielded with the Egyptian Army. Eventually, the country hopes to replace its entire inventory of Soviet-era tanks. In the meantime, the Army is studying the possibility of upgrading its 600 T-62 tanks with a new, more powerful engine. Favored at this time is the 1,500hp SACM V8X-1500 Hyperbar diesel engine used in the French Leclerc tank.¹¹ Egypt's 800 T-55 tanks remain in storage.

An American-Fueled Arms Race

Eager to solidify its position as the number one arms supplier to the Middle East, Washington has shown little reluctance to hold back on the transfer of advanced equipment to the region. Egypt has been one of the largest purchasers in recent years with the acquisition of a vast assortment of missiles, combat ships, artillery, attack and reconnaissance aircraft, surveillance drones and munitions. Tanks are no exception.

In a surprise move, the Defense Department announced in late 2003 that it would permit the M1A1 tank fleets of its allies in the Middle East to be upgraded to the M1A2 configuration. The move would dramatically enhance both the lethality and survivability of the Abrams by giving it capabilities comparable to front line US forces. The only other countries in the Middle East that currently operate M1A2 tanks are Kuwait with 218 and Saudi Arabia with 315. Recently, Washington approved a \$26 million contract from General Dynamics Land Systems to reconfigure the first 14 Egyptian Abrams tanks to the M1A2 model.¹²

So effective was the M1 during the 1991 Desert Storm campaign that not a single round fired by a Soviet-made T-72 was able to penetrate its armor plate made of depleted uranium. In fact, most Iraqi tanks were engaged by US forces beyond their firing range and destroyed by M1 tanks at between 3,000 and 3,500 meters using M829A1 APFSDS-T ammunition.

The M1A2 upgrade is an attractive option for Egypt which is eager to narrow its technology gap with Israel. Nearly a quarter of a century after the peace treaty between Egypt and Israel was signed, Cairo still nurtures the goal of achieving strategic parity with the Jewish state. Egypt's Chief of the General Staff, Marshal Hussein Tantawi, has made it plain that his country not only seeks to improve the effectiveness of its air, land and sea forces, but is working to give them a power projection capability as well.

In August 2001, just one month before the terrorist attacks on New York and Washington, a senior Egyptian official was reported to have threatened that if Israel reoccupied the Palestinian territories, Egypt order armored units belong to its Third Army into the Sinai Peninsula.¹³

Talk of this sort has done little to slow the transfer of American arms to Egypt. In fact, the pace has quickened in recent years as Washington has emerged as the preferred arms supplier to the Middle East, a region already bristling with armament and conflicts on nearly every border.

Understandably, policymakers in Jerusalem have become increasingly worried that the US is abandoning its historic commitment to ensure Israel's qualitative military edge against any combination of adversaries. It is a pledge that has been reaffirmed by successive administrations, both Republican and Democrat, over the last two decades. Instead of strengthening Israel, this proliferation spiral has only weakened the country, draining its already fragile economy of scarce resources and forcing its military to devise new and evermore imaginative battlefield solutions to weapons supplied by Israel's principal ally.

Jerusalem's concerns were reinforced in February 2002, with the declaration from Cairo that Egypt no longer considered its defense relations with Washington connected to its peace treaty with Israel.¹⁴ Instead of issuing a strong condemnation of this policy shift, the Bush Administration rewarded Cairo by agreeing to

the sale of 53 satellite-guided Harpoon Block II anti-shiping missiles to Egypt. This advanced system can be employed like a cruise missile to accurately strike targets on both land and sea.

Responding to Egypt's massive arms build-up Israel's Defense Minister, Shaul Mofaz, told the Israeli daily *Ma'ariv* recently:

We look with concern at the strengthening of Egypt and we ask: what is it for? After all, we have peace with Egypt and I see no country threatening them. A new reality may develop that in a few years there will be a different leadership in Egypt and that could change how they relate to Israel.¹⁵

In fact, the situation today in Egypt looks very much like it did in Iran during the last days of the Shah. The country's growing political instability, lack of a clear succession plan and the growing power of radical Islam, could easily throw the country into chaos. The result would be that a large amount of highly sophisticated weaponry would fall suddenly into the hands of individuals committed to the downfall of Israel and the destruction of US interests in the Middle East.

Since 1981, Washington has contributed significantly to the operational effectiveness of the Egyptian armed forces by sponsoring the biannual Bright Star exercise. Armor and anti-armor scenarios have always figured prominently in the training regime. In recent years, the aggressor force used in the exercises has been modeled after the Iraqi military. During the last Bright Star gathering 58,000 troops from the US, France, Britain and several Gulf States converged on Egypt for a month of war games and information sharing.

Ironically, this activity has allowed the Egyptian armed forces to refine their operation doctrine and in fact to benefit, indirectly, from many of the hard won lessons learned by Israel in its various military campaigns. While Israel and the US maintain a close working relationship at all levels of military interaction, the fact remains that Jerusalem can not control what American officials do with the observations and insights they glean during joint exercises with the IDF.

One of the most outspoken Israeli critics of the Egyptian military build-up has been Yuval Steinitz, chairman of the Knesset Foreign Affairs and Defense Committee. In a recent report he noted:

The last decade has seen a very sharp rise in military expenditures in Egypt, beyond the amounts that poor country gets from the United States annually... Up to now, Egypt has received more than \$30 billion in military aid from the United States. Israel has received slightly more in the last 22 years, but we have had to spend much of it on war – against Palestinian terrorism, against Hizbullah in the north, against the Iraqis who in 1991 struck Israel with Scud missiles, and other military campaigns Israel was forced to conduct.¹⁶

It is in the area of armored systems and the equipment needed to support offensive armor operations where the US has been particularly helpful to the Egyptians. In 2003, Washington agreed to sell Egypt 10,040 non-standard Armor Piercing Fin Stabilized Discarding Sabot-Tracer Kinetic Energy Tungsten Advanced (APFSDS-T) armor-piercing rounds under a contract worth \$54 million.¹⁷ This advanced tungsten projectile, used in conjunction with the improved targeting systems in the M1A2, significantly enhances the killing power of the American-made tank.

In 2002 Egypt purchased 5,000 KEW-A1 armor piercing shells from the US made of depleted-uranium (DU), the tank ammunition adds significantly to the lethality of Egyptian armor.¹⁸ Another contract awarded to Alliant Techsystems in August of that year called for assisting Egypt to establish an indigenous capability to produce 120 mm tank training ammunition.

Recently, Egypt has made a number of additional acquisitions which directly support the modernization of Cairo's armored fleet as well as its anti-armor capability. By supplying this equipment and training the US has enabled Egypt to field a military force tailored to offensive operations. Some of these systems include:

- Co-Production of 21 M88A2 Hercules Heavy Recovery Vehicle Kits. These vehicles are used for "towing, wrecking, and hoisting operations supporting recovery operations and evacuation of heavy tanks and other tracked combat vehicles".¹⁹

- Purchase of “26 Extended Range-Multiple Launch Rocket Systems (ER-MLRS) with fire control panels, 485 ER-MLRS rocket posts (six rockets per pod), 22 reduced range practice rocket posts (six rockets per pod), one MLRS fire control proficiency trainer, three M88A2 recovery vehicles, 30 M577A2 command post carriers...” and other support equipment.²⁰
- Purchase of 459 AGM-114K3 Hellfire II Air-to-Surface Anti-Armor Missiles.
- Purchase of 500 M1045A2 High Mobility Multi-purpose Wheeled Vehicles (HMMWV) to be fielded with TOW weapons systems.²¹
- Approved the delivery of 120 embedded diagnostics personality system vehicle sets for the M1A1.²²
- Purchase of components for surface-to-surface rockets, principally M77 grenades with new fuses.²³

As the weight of Arab arms tips ever more precariously against Israel, Washington continues to deny it is a large part of the problem. In each of the notifications it sends to Congress of pending arms sales the Pentagon trumpets the same well worn assertion, that: “The proposed sale of this equipment and support will not affect the basic military balance in the region.”²⁴ The facts, though, suggest otherwise.

Indeed, the Pentagon has never provided a means for accurately gauging just how the sale of offensive weapons to Arab allies not under threat of attack will help to preserve the balance of power in the region.

The US Department of Defense justified its recent sale of an additional 125 M1A1 tanks to Egypt by declaring:

This proposed sale will contribute to the foreign policy and national security of the United States by helping to improve the security of a friendly country which has been and continues to be an important force for political stability and economic progress in the Middle East.²⁵

The use of such boilerplate language in virtually every congressional notification makes a mockery of a process which is supposed to provide oversight and direction to American arms sales policy.

Many political observers find it astonishing that Washington continues to lavish military hardware on Egypt despite the country’s increasingly confrontational stance towards the US. In recent years the two governments have sharply divided over questions of Iraq sanctions, the Bush Administration’s toppling of the Saddam Hussein regime and the subsequent US occupation of Iraq, Washington’s support for Israel, America’s post-9/11 policy of pre-emption and the White House goal of extending democracy throughout the Middle East.

Despite this divergence in policy, Egypt’s President, Hosni Mubarak, continues to tout his nation as one of America’s closest allies in the region. That show of fealty has brought enormous financial rewards. In addition to the \$1.3 billion in military assistance Cairo receives annually from the US, the Bush Administration approved an additional \$300 million in aid in 2003 along with \$2 billion in loan guarantees, ostensibly to offset the loss in trade revenue resulting from the Iraq war – a war which Egypt opposed.

Congress, though, has been less than sanguine about Egypt’s treatment of the US and Israel in recent years. In January 2004, Representative Anthony Weiner (D-NY), introduced a bill that would convert US military assistance to Egypt into economic assistance as a protest against that country’s growing militancy.

Termed the “Egyptian Counterterrorism and Political Reform Act”, the bill makes note of Egypt’s failure to halt the smuggling of weapons contraband across its border with Israeli-controlled Gaza, its public support of Hizbullah attacks against Israel, the continued incitement against the US and Israel in the government controlled press, Cairo’s flagrant abuse of human rights and its refusal to normalize relations with Israel despite commitments made in the 1979 peace treaty between the two countries.²⁶

In a similar vein, Senator Mitch McConnell (R-KY), Chairman of the US Senate Foreign Operations Appropriations subcommittee has called for the wholesale reform of Egyptian economic and military programs as well as a halt to its human rights abuses as a pre-condition of future American assistance.²⁷

In the autumn of 2002, with war against Saddam just months away, Washington asked the Mubarak Government for permission to allow American forces access to Egyptian bases.²⁸ Mubarak refused. Yet, just over a year later, Washington agreed to a strategic dialogue with Cairo aimed at improving US-Egyptian defense ties and bolstering Egyptian defenses.²⁹

In October 2002, Egypt conducted the latest in a series of large scale live-fire exercise in the Sinai Peninsula designed to test the inter-operability of its modernized air defense capability.³⁰ The 10 day exercise termed "A`asar-2002", focused on the breakout of the Third Army across the Suez Canal and through fortifications. According to reports 120 aircraft participated in the exercise which used "reconnaissance and imaging technology to destroy mock enemy targets".³¹ Tanks and armored vehicles were among the targets. Israel, the country with whom Egypt has a peace treaty, was the presumed adversary.

In recent years, Egypt also has stepped up its consultations with Syria,³² China, North Korea and Russia in a bid to boost military cooperation and diversify its sources of arms.³³ The result is an arsenal bristling with weapons of a clearly offensive character. Among the most worrisome are 24 No-Dong missiles provided by North Korea. Each can be modified to carry a nuclear, chemical or biological warhead and has an enhanced range capable of covering all of neighboring Israel.³⁴

In 1996 Egyptian Chief of Staff Tantawi declared:

Peace does not mean relaxation. The endless development of military systems and the arms race prove that survival is only assured by the strongest and that military strength will always be necessary. Military strength has grown to be a prerequisite of peace. Any threat to any Arab or African country is a threat to Egypt's national security.³⁵

Enter the Merkava

Israel's answer to these improvements in Arab armor is the Merkava main battle tank. First deployed in the late 1970s, the Merkava, or "Chariot", is Israel's only domestically built heavily armored combat system.

Today, the Merkava forms the backbone of the Israeli armored fleet with nearly 1,300 vehicles in active service. Its rugged yet flexible design makes it ideally suited to force-on-force engagements or use in providing tactical support to Israeli soldiers during times of civil unrest.³⁶ Eventually, the IDF plans to replace the country's entire inventory of aging American-made M-60 (Magach) tanks with the Merkava.

The Merkava has undergone four major design changes since its introduction into the country's order of battle. In its most modern configuration, the Merkava Mk 4 was introduced into the IDF in the summer of 2003. The tank boasts a stabilized gun platform, advanced suspension, a high velocity smoothbore 120mm gun, full night fighting capability, individual air conditioning, a state-of-the-art fire control system, a 10 round electrically operated magazine, and an upgraded GD883 V-12 engine rated at 1,500 hp.

The main gun can fire an array of ammunition to include 120mm kinetic, HEAT and anti-personnel rounds as well as the Israeli-developed Lahat, a tandem warhead missile designed to defeat armored vehicles shielded with reactive armor.

In the view of many of the world's armor experts, the 65 ton Merkava is equal to, or better, than any of its rivals. It also is considered to be among the "best protected tanks in the world".³⁷ Its advanced modular armor system protects the vehicle against the "penetration of APFSDS (Armor Piercing Fin Stabilized Discarding Sabot) shells and all known ATGMs". Extra plating shields the turret from top-down attack.³⁸

So confident is the IDF in the survivability of the Merkava that it has indicated a willingness to retire two of its older armored vehicles for every Merkava tank it procures.

The Merkava is the brainchild of Israel's legendary tank designer, General Israel Tal, who not only sought a highly maneuverable multi-role armored vehicle, but also one which placed a premium on crew

survivability. For added protection, the vehicle's engine is mounted forward of the crew compartment while its ammunition is stored towards the rear for better protection.

Unlike other main battle tanks, the Merkava doubles as a troop transporter. Its rear entry design enables up to eight fully equipped soldiers to be carried safely into combat. A 60 mm mortar mounted inside its hull along with three 7.62 mm machine guns permits the crew to provide suppressive fire at close range while also using its main gun to deliver precision strikes against fortified enemy positions.³⁹

This was proven in April 2002, during Operation Defensive Shield when the IDF employed Merkava tanks to dislodge Palestinian terrorists holed up in the fortified concrete buildings in the Jenin refugee camp.⁴⁰ The Merkava was the weapon of choice for military commanders concerned that the use of F-16 aircraft and artillery to destroy terrorist positions would risk unacceptable collateral damage and lead to a high loss of civilian life within the densely packed refugee camp.⁴¹ Since the collapse of the Oslo process in September 2000, the Merkava has successfully supported Israeli military operations throughout the West Bank and Gaza.

Even as the Merkava has significantly bolstered Israel's security, the presence of large numbers of the American M1 Abrams tanks in the hands of a well-trained enemy could alter the strategic equation in the region. Used in conjunction with advancing artillery, close air support and missiles armed with chemical or biological warheads, the M1 could present the IDF with a situation it has never before faced – near parity in offensive armored systems.

To address this challenge, the Merkava incorporates the Amcoram LWS-2 laser warning system that allows a commander to detect and track the launch of incoming missiles. Its survivability is further enhanced by the incorporation of a positive pressure crew cabin to protect against an external NBC threat. Four cameras mounted in hardened recesses on the hull afford the commander a 360 degree panoramic view of the tank's surroundings under both day and night conditions.

The Merkava is the centerpiece of Israel's three regular and nine armored divisions. It is the principal instrument through which IDF ground commanders are able to implement Israel's version of lightning war, a doctrine which calls for the IDF to win all of its battles quickly and decisively and with the fewest possible casualties.⁴² When fully mobilized, Israel is able to increase its armored strength from 20 to 33 brigades enabling the country to simultaneously defend against ground attack along each of its borders.

Targeting for the Merkava's main gun is carried out by a ballistics computer and aided by an advanced forward-looking infrared (FLIR) system. Developed by El-Op, it can operate under all weather and light conditions.

The debate over the Merkava has its corollary in the recent decision of the IDF to acquire the American-made Stryker LAV-3, a lightly armored personnel carrier (APC) that is to replace its older M-113A1 and M-113A2 APCs. Weighing in at 19 tons and with a maximum speed of 62 mph, the Stryker sacrifices lethality and protection for speed. It operates on eight wheels instead of tracks and can travel for miles even when all of its tires are flat.

Following the lead of the US Army, the IDF sought a combat transport vehicle that could deliver soldiers to the battle front with greater maneuverability than current APCs while also being able to operate in the crowded urban terrain of the West Bank. The IDF plans to buy 500 Strykers for \$750 million.⁴³

Proponents of heavy armor note that the Merkava is optimized for just these conditions while also having the ability to insert troops into hostile environments under the safest and most comfortable conditions possible. In past years, the IDF had rejected the Bradley Fighting Vehicle (BFV), another lightly armed combat system, in large part because it lacked sufficient armored protection.⁴⁴

Unlike the Merkava, the Stryker lacks a powerful gun, is vulnerable to RPGs and IEDs and has no air conditioning, an important consideration when desert temperatures can often soar above 110 degrees in the vehicle. Its skin is composed of steel and aluminum and is covered with 130 protective tiles. The US first

deployed a Stryker brigade to Iraq in October 2003. Two months later, on December 14th, the Stryker's vulnerability was demonstrated when an IED destroyed one vehicle in an attack near Ar-Ramadi.

The IDF is anxiously monitoring the Stryker's performance in Iraq knowing that its success or failure will be influential in the debate over what type of armored force will be most useful for Israel in the years to come.

Challenges Facing Israel

While the Merkava represents the pinnacle of heavy armor systems, its future as an ongoing industrial concern remains in doubt. Faced with the effects of a deep recession, a severe drop in government revenue and the rising cost of the Palestinian war, advisors to Israel's Prime Minister, Ariel Sharon, have argued that the program has simply become unaffordable and must be scrapped.

The first hint of trouble came during the summer of 2003 as Israel's Ministry of Finance was preparing its FY 2004 budget proposal. At that time the Treasury recommended a reduction in defense expenditure of approximately NIS 7.1 billion or \$1.6 billion. The Ministry of Defense countered that a decrease of this magnitude would break the back of the IDF by forcing the cancellation of critical programs and hasten the drastic cutback in the Army's operational tempo at a time of national emergency. Israel's General Staff argued that even a reduction of NIS 3 billion (\$684 million) was unacceptable.

With little room to maneuver, officials at the Finance Ministry, supported by those in the IDF Planning Branch, proposed halting the manufacture of the Merkava tank as a way of slowing the country's budgetary hemorrhage. Their recommendation reflected a growing split within the ranks of the military over whether the growing lethality of modern anti-tank weapons was in fact making heavy armored vehicles obsolete.

By one estimate, eliminating the Merkava program would save the IDF less than NIS \$1 billion annually, roughly \$220 million, or about the amount spent each year on the acquisition of 50 tanks.

The effect on the Israeli economy as a whole would be far more significant with the cost in unemployment, missed investment, lost exports, and curtailed research and development reaching, perhaps, into the billions of dollars. Indeed, the negative economic effects could well exceed those of the cancelled Lavi fighter program nearly two decades ago.

Defense is one of the principal engines of the modern Israeli economy and military R&D is often the catalyst for innovation in the civilian sector. Products derived from defense research form the basis for much of the country's high technology exports. Without the Merkava, the industrial base will lose an important infusion of technical know-how and investment.

In yet, another sign of growing military austerity, the Israeli MoD has eliminated funding for all new R&D projects in its FY 2004 defense budget. This is a direct result of a cut in overall military expenditure of NIS 3 billion (US\$680 million).⁴⁵

Speaking at the Herzliya Conference in December 2003, Yaakov Sheinin, CEO of *Economic Models Israel* noted the enormous impact of defense on the Israeli economy.

Every dollar in Ministry of Defense orders produces \$2.40 in defense exports, which have an added value of 66%. If the economy emerges from the recession with five percent growth in 2004, it will take until 2010 before employment falls to six percent. For every public sector worker they want to fire, the private sector wants to fire two.⁴⁶

Critics of the plan to scuttle the Merkava have been quick to rally in support of its continued production. Former Defense Minister, Moshe Arens observed:

Developing a new fighter aircraft at this time will take more resources than Israel could possibly afford. It might be done if another partner could be found for the project. As for the Merkava, it is the best main battle tank in the world and its production should certainly not be stopped.⁴⁷

According to the Israel Manufacturers Association (IMA), the Merkava program is responsible for between \$200 million and \$250 million in annual defense technology exports. This is in addition to the \$688 million Israeli industry is slated to receive from the Government of Turkey for the upgrade of 170 M60A1 tanks. The potential exists for this number to rise to 900 Turkish tanks, but only if the Merkava project is kept alive.⁴⁸

Terminating the Merkava line would end any hope of future overseas tank sales as well as the possibility of co-production and licensing agreements on related technology. The shock to Israel's defense industries would be enormous, compounding an already serious decline in overseas orders. In 2003, the country's military exports fell by 37% from their high just the year before.

At the present time, 220 companies supply subcomponents to the IDF, the Merkava's prime contractor. Of these firms, all but a handful are Israeli. Approximately 22% of the Merkava's content is of American origin.

In the event of a shutdown, between 6,500 and 10,000 workers could lose their jobs. Many of the affected companies reside in development towns across Israel – from Kiryat Shemona in the north to Mitzpeh Ramon in the south – where unemployment is high and the effects of the current recession have hit hard.

It is unlikely that many of these workers, many skilled in metal fabrication, electronics and systems integration, will find alternative employment in a country already suffering from a saturated labor market and massive cutbacks in its industrial sector. As a consequence, a large number may seek jobs overseas, accelerating the flight of Israel's intellectual capital, slowing external investment and worsening the country's prospects for an economic recovery.

Many current and former IDF commanders have criticized the government's budget plan, noting that what is happening to the Merkava is merely emblematic of a growing erosion in Israel's overall national security posture.

"These are unacceptable tradeoffs," observed Maj. Gen. Haim Erez (Res.).

The Merkava is the principal vehicle the military has to seize and hold ground. Its design reflects decades of operational experience, experience gained at a very high cost in lives and money. Important, as well, is the fact that the effect of closing the program will be felt throughout country's defense industrial base. Israel's economy will suffer irrevocable damage as a result.⁴⁹

Erez and his brigade were the first to cross the Suez Canal during the 1973 Yom Kippur War in hot pursuit of the retreating Egyptian Army.

Since its inception, Israel has spent upwards of \$6.5 billion in developing and acquiring the Merkava.

With the future of the Israeli tank program in limbo, the MoD has shelved plans to develop the next generation armored vehicle, the Merkava 5. Reports emanating from the IDF hint that the Army was considering replacing the Merkava's tracks with wheels in an effort to make it faster, lighter and, in the view of some experts, more maneuverable.

Ultimately, though, salvation for the Merkava may come about through the privatization of the main production line. Talks are now underway between Israel Military Industries (IMI) and Urda Industries to purchase the Government's interest in the program. An Urda subsidiary, Associated Steel Foundries of Netanya, is responsible for casting many of the armored portions of the tank to include the turret, hull, tracks and suspension. If concluded, this deal would permit the restructuring of the program and the possibility of overseas sales.

Whether on the battlefield or in the marketplace, the future success of the Merkava rests, for the foreseeable future, on the commitment of the Israeli government to continue to modernize its tank inventory. This means not only will Jerusalem need to make an ongoing investment in tank technology, but it also must ensure that an economic rate of production is maintained as well.

It takes approximately 30 months for a fully operational Merkava tank to be assembled. Any hiatus in production funding could have significant economic consequences for the companies responsible for the

program. Many have placed orders for long lead items with some, like the American-made engine, extending out three years. Contract termination penalties could run into the hundreds of millions of dollars.

At present, the IDF has booked orders for the Merkava through 2007. With the current industrial base that will require that the country manufacture between 60 and 70 Merkava Mk 4 tanks per year. At this relatively modest rate of production and given Israel's current number of tanks that would mean that a vehicle built today can be expected to have a service life of between 50 and 80 years. By any reasonable standard, this is an excessive amount of time for the fielding of a ground combat vehicle.

Abrams Alternative for Israel?

In place of the Merkava, some Israeli government officials have suggested that Israel should consider adopting the American M1 Abrams as its primary MBT. They argue that this would help to standardize US and Israeli equipment and, in theory, allow Israel to divest itself of a costly production line. An arrangement of this sort would probably rest on an American commitment to allow Israel to incorporate its own proprietary technology in its tanks.

Israel's Finance Minister, Benjamin Netanyahu, has lent his support to this idea and suggested further that the tanks be paid for with the military assistance Jerusalem receives annually from the US.⁵⁰ With the recent defeat of the Iraqi army and the removal of Saddam Hussein from power, Netanyahu contends that Israel no longer needs such a large standing armor force to protect the country's eastern frontier.

Even so, there are at least six principal reasons why Israel's adoption of the Abrams M1 tank is impractical and, at the present time, has little chance of succeeding.

First, the prime contractor for the M1, General Dynamics Land Systems, no longer maintains a manufacturing line for the tank. Restarting full-scale production at its Lima, Ohio facility would simply be too costly and too impractical. It is more than likely the Pentagon would oppose such a move as it focuses on developing a successor to the Abrams.

Second, the base cost for the M1 Abrams tank is approximately \$8-9 million against the cost of a new Merkava at approximately \$4-5 million. This price difference puts the Abrams out of reach of the current Israeli defense budget plan.⁵¹

Third, a new heavy weapon system requires a large support infrastructure for maintenance and repair. Here again cost is a factor. Israel simply can not afford to have two parallel logistics tails for its tank inventory. Besides the expense, it would only add to the difficulty of providing fast and efficient support to armored units in wartime.⁵²

Fourth, a well-oiled production infrastructure for the Merkava allows Israeli commanders to requisition spare parts on an as-needed basis. Equipment lightly damaged in combat can be repaired and quickly returned to the field.

Fifth, Israel has learned through hard experience that reliance on a foreign source of supply for spare parts for its military significantly inhibits the country's freedom of political action. With dependency comes control. Successive generations of Israeli leaders have tried to improve the self-sufficiency of the country's military to lessen the amount of leverage any third party has on the conduct of its foreign and military policy.

At present, a joint venture between the German firm MTU and GDLS is responsible for the production of the Merkava's GD883 diesel engine and Renk RK325 automatic transmission in the US. This had to be done to circumvent an arms embargo imposed by Germany on Israel for its actions taken in its war with the Palestinians.

Sixth, any Israeli purchase of Abrams tanks would have to be made in dollars. Israel relies heavily on dollar denominated foreign exchange for the purchase of essential overseas items from the US dollars are precious

Treasury assets and always in short supply. For the time being, most of Israel's military assistance dollars are committed to other priority acquisition programs.

Either Israel would have to make funds available out of its shrinking national budget to pay for the imported tanks – a costly option – or it would have to earmark a portion of its US foreign assistance for that purpose. Which ever choice Jerusalem would make, the procurement would place an undue strain on the country's finances and displace other high-ticket programs vital to Israel's national security.

Another advantage conferred by local Merkava production is that Israel is able to finance much of its current content using a portion of the US military aid package designated as Offshore Procurement (OSP). These are funds that can be converted into shekels and spent locally in Israel. Of the \$2.33 billion in military assistance provided by the US to Israel in 2004, \$565 million, or 26%, may be used for Offshore Procurement.⁵³ These funds are critical to helping to maintain a strong defense industrial base in Israel.

Even as the fate of the Merkava was being decided, the IDF decided to go ahead with the decision to purchase the Stryker armored vehicle. Cash starved and forced to cut back on essential training, the Army nonetheless decided that it had the funds to launch an entirely new procurement program. The \$750 million price tag for the Stryker is to be paid for using scarce US foreign assistance dollars. Whereas most funds spent on the Merkava are used domestically to boost the Israeli economy, those spent on the Stryker are returned to the US and the prime contractor for the system, General Dynamics.

Adopting a foreign weapons system as important to Israel's national defense as is the heavy tank would run contrary to the goals of successive governments. With the harsh lessons of the 1973 Yom Kippur War still fresh in the minds of many Israelis, few would have an interest in returning to a time when Washington was able to stop an advancing Israeli Army dead in its tracks simply because it controlled the supply of spare parts.

Another possibility is that Israel would agree to exchange technology contained in the Merkava tank for a place on the American team developing the replacement for the Abrams M1-A2 tank. Presumably Israel would then have the right to supply components for the project and eventually acquire the new vehicle, in quantity, for its own fleet.

According to reports that surfaced in late 2003, this idea was broached in talks between James Albaugh, the President of Boeing Integrated Defense Systems, and Maj. Gen. Yiftah Ron Tal, Commander of IDF Ground Forces.⁵⁴ Boeing is spearheading the effort to design a new armored system as part of the Army's Objective Force strategy scheduled to become operational by 2010. The Future Combat Systems program is intended to develop vehicles that are lighter, highly maneuverable and more lethal than traditional heavy tanks while also being air transportable.

It may be some time before the Pentagon decides if it will be allowed Israel to participate in new DoD effort. Equally uncertain is whether the specifications for America's future tank will coincide with Israel's requirements. The IDF, for instance, has no need to sacrifice armor protection for air deployability.

Israel's Worsening Budget Dilemma

The fact remains that the IDF has found it impossible to fund many of its priority programs, not only the Merkava. Equipment maintenance, training, the purchase of spare parts, research and development (R&D), and the acquisition of new weapons platforms have all been slashed in a bid to pay for current operations and personnel costs. This state of affairs has become so severe that the IDF announced at the start of 2004 that Army reservists would soon be training without live ammunition because funds simply were not available to make the necessary purchases.⁵⁵ In some cases, reserve armor units have not received live training ammunition for the past three years.

The situation is the same in the Navy and Air Force where patrolling and flying hours also have been cut in an effort to reduce training costs.⁵⁶ According to one report, the IDF is planning “to rent one of its training facilities to friendly foreign armies” as one way of raising much needed revenue.⁵⁷

This dramatic fall off in readiness has led some military observers to conclude that the country is as ill prepared for general war as it was in the months prior to conflict in 1973. If true, this is a startling revelation and one which argues strenuously for an increase in current Israeli defense spending. Commented Shaul Mofaz, the country's Defense Minister, “it could be that the security situation in 2004 will be worse than it is now because of the fact that we will be unable to provide a security response to threats.”⁵⁸

In FY 2002, Israel's defense spending was cut by NIS 7 billion. In FY 2003 the reduction was NIS 2.25 billion.⁵⁹ Today, Israel's overall defense budget stands at roughly NIS 35.2 (\$8.0 billion) or about seven percent of GDP. By contrast, in 1984 Israel's defense budget stood at \$11.3 billion or 24.5% of GDP.⁶⁰ In 2004, approximately 13% of Israel's state budget will be devoted to defense.

Additionally, the Ministry of Defense is spending an estimated NIS 2 billion (\$460 million) annually to quell the Palestinian uprising.⁶¹ This figure does not include the cost of constructing Israel's security barrier or large scale mobilizations like Operation Defensive Shield.

The Tank's Tumultuous Future

For the foreseeable future, it would appear the tank's place on the modern Middle Eastern battlefield is secure. Yet, like all military systems it will have to continue to evolve. A renaissance in heavy armored systems may yet mark the tank's future.

For the Israel soldiers who fought in the Yom Kippur war of 1973, the tactical importance of the tank was proven convincingly on both the Egyptian and Syrians fronts. After being routed from their positions along the Suez Canal following Egypt's surprise attack, a battered Israeli army recovered from near defeat by employing superior armored tactics backed by air cover. By the time the US brokered ceasefire took hold, the Egyptian Third Army had been surrounded and its 45,000 men and 250 tanks threatened with annihilation.

There are many lessons to be drawn from this experience. The first of these is that Israel must not significantly sacrifice quantity for quality in planning for future ground combat scenarios. While there are many factors that contribute to victory in war – training, tactics, superior equipment – it is also a fact that combat can not be sustained on a high attrition battlefield without a sufficient reserve of men and equipment.

Second, a robust industrial base for armor should be maintained to support not only peacetime developmental efforts, but also to serve as a source for the rapid delivery of spare parts and maintenance activity in wartime.

Of the 2,000 tanks fielded by Israel during the 1973 war, 400 were destroyed in combat. Many more were damaged, repaired and returned to the fighting. By contrast, Egypt lost half of its armored force or 1,100 tanks out of an inventory of 2,200. Syrian losses amounted to 1,200 tanks out of 1,820 pressed into service.⁶²

As Israel's economic situation weakens, that of the Arab World appears to be improving. According to one economic forecast, GDP in the Middle East and North Africa could reach 3.4% in real growth in 2004.⁶³ By contrast, Israel will be lucky to achieve a 2.0% increase in its GDP during the same period. With a growth rate of only 0.7% in 2003, Israel was ranked 24th out of 25 emerging economies by the British magazine, *The Economist*.⁶⁴

At the same time, military spending throughout much of the Arab World continues to grow.

If this trend persists, the Jewish state could find itself matched by its potential enemies in both the quality and quantity of military equipment at their disposal. This could pose a serious readiness problem for a country that has striven, since 1967, for self-sufficiency in most areas of its national defense.

And what does the future hold for the Merkava? In a meeting with managers and workers at one of the main Merkava facilities on December 23, 2003, Israeli Defense Minister Shaul Mofaz announced that for the time being tank production would continue.

The Merkava is “vital to Israel’s security”, he declared. “This is the flagship of the ground-based projects. This project, like the rest of the defense industries, is an important strategic and technological base for Israel and we can’t harm it.”⁶⁵

Mofaz’s comments were echoed by the Director General of Israel’s Ministry of Defense, Maj. Gen. Amos Yaron (ret.). “This tank will continue to be built. Perhaps there will be difficulties in the coming year; and perhaps we may need to decrease the number of tanks to be produced, but this project will not stop. I repeat, this project will not end.”⁶⁶

Addressing the role armor might play in the IDF of the future Yaron added: “The requirement for tanks remains, and the requirement for the quality represented by the Merkava Mk 4 remains unchanged. It is not possible to settle for less quality, and therefore this tank will continue to be built.”⁶⁷

These are certainly reassuring words to the thousands of soldiers and workers whose lives and livelihoods depend upon Israel’s commitment to heavy armor. Yet, without a new national consensus in Israel on the need for increased defense expenditure, the upbeat assessment of both Mofaz and Yaron may amount to little more than wishful thinking.

Conclusion

There is little in today’s debate over tank warfare in the Middle East that does not have its parallel in an earlier, troubled time.

The year was 1964. Tensions in the region were on the rise. In January, the Arab League convened a summit in Cairo to establish a Unified Military Command with Egypt at its head. Members also agreed to the formation of the Palestine Liberation Organization (PLO) and a strategy of terrorist war that lives on until today. Throughout the region, countries prepared for war.⁶⁸

In Washington, all eyes were on the developing situation. On March 12th the Acting Chairman of the Joint Chiefs of Staff, General Earle G. Wheeler, sent a memorandum to then Secretary of Defense Robert McNamara in which he discussed the desirability of selling tanks to Israel. Four questions framed the issue.

1. “Whether a significant imbalance exists in the relative strengths of the Arab-Israeli military forces”;
2. “The need for Israel to augment its tank strength”;
3. “The need for modernization of Israel’s tank force”; and
4. “Possible substitution of antitank weapons that would meet Israel’s needs”.

Forty years later, these same questions resonate in the debate over role armor should play in the future defense of Israel.

The Joint Chiefs were frank in their assessment of what Israel required at the time.

There is a military need for Israel to modernize its tank force because the bulk of its tank inventory is obsolescent. The Arabs (Egypt, Syria, Jordan, Saudi Arabia, Lebanon, and Iraq) have already gained a favorable modernization differential as well as a numerical advantage, and they are gradually improving their training and maintenance.⁶⁹

“With reference to the question of substituting antitank weapons for tanks,” the Chiefs continued,

...it must be noted that these weapons are complementary to each other. Even though a nation may have adopted a defense strategy, there is a requirement for an offensive tactical capability to repel and, if necessary, eject

enemy forces which have penetrated its territory. Thus, Israel has a need for an appropriate mix of tanks and antitank weapons in order to maintain a balanced military force.

Just three years later, in the Six Day War, Israel was attacked on three fronts by a combined Arab force. Had the IDF not been in possession of a robust and well-trained armored corps, it is unlikely Israel would have prevailed on the ground as it did in the air.

In 1964 the message from the Pentagon's Joint Staff was that the tank had emerged as an integral part of the arsenals of both the Arab States and Israel. Its continued employment by either side would not be deterred by the growing lethality of anti-armor weapons.

The lesson for today is clear. As long as improvements in the design, offensive firepower and survivability of armored systems are possible, the tank will remain the dominant ground combat vehicle on the battlefields of the modern Middle East well into the twenty-first century.

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