

## **XII. THE COMBINED ARMS AND THE LAND WAR**

### ***12.0 The Land War***

The Iran-Iraq War presents far more lessons about the problems of technology transfer, and converting Third World armies to effective mechanized forces that are capable of combined arms operations, than it does about weapons and technology. Neither Iraq or Iraq was ever able to exploit its land weapons to their full potential. In fact, both had serious problems in conducting effective offensive maneuvers during most of the war, and in achieving more than mediocre results with combined arms.

While Iran was hurt by its lack of easy access to modern arms, and resupply for its Western made equipment, the major problems on both sides were their lack of organisation and training for modern war. This helps explain why force ratios had so little real impact on the outcome of the battle. The issue was rarely the total number of forces engaged, it was rather the comparative effectiveness of those force elements which could be directly engaged in combat. It also helps explain why Iran's human wave tactics could be effective in many instances against a massive Iraqi superiority in firepower.

The general problems each army faced have been described in the historical analysis of the war, along with the problems Iran had in developing effective forces in the face of constant interference by its senior Mullahs, and that Iraq faced because of the initial politisation of its armed forces and the over-centralized of command authority under Saddam Hussein. While a detailed analysis of the key aspects of land performance does provide some additional insights, it is important to stress that the most important insights are into the strengths and limitations of Third World armies and not into the relative effectiveness of their weapons.

### ***12.1 Combined Arms***

Neither Iran nor Iraq began the conflict with any real mastery of the operational art of war, and neither side developed a consistent capability to carry out combined arms operations effectively, although Iraq made major improvements in 1987 and 1988. Both sides also learned that sheer mass is not substitute for combined operations. Iran learned this in the case of its human wave attacks. Iraq learned it in terms of its use of defensive firepower.

Both sides lost large numbers of tanks and armored vehicles during the first years of the war because they forced their armor to fight without proper support from artillery and infantry, or because they used them inflexibly in static defensive roles and as direct fire artillery. These problems were especially serious at the beginning of the war. One of the major reasons that the Iraqi offensive bogged down in 1979-1980, was that Iraq attempted to use armor/mechanized units without dismounted infantry in terrain and built-up areas that clearly called for dismounted support. As the war progressed, the Iraqis made better use of infantry support for their armored vehicles, but failed to develop independent foot infantry and an efficient counterattack capability.

The Iranians, on the other hand, had to assume an "infantry heavy" offensive strategy since much of their armor was not operational or properly manned at the start of the war and they were usually unable to replace or repair damaged and destroyed weapons. Iran has gradually trained its infantry to fight alone, or with nothing more than limited artillery support, in marsh or mountain terrain, but Iranian infantry was not been able to sustain offensive thrusts without armor or more artillery. Iran often achieved limited advances even against well prepared Iraqi defenses, but failed to achieve decisive results. During 1986-1988, Iran also learned at great cost that it could not achieve a decisive exploitation of its initial gains without more armor, more mobility and better logistics support.

Both sides relied on artillery as well as infantry. Iran has proved superior in target acquisition and shifting fires, and Iraq has been superior in massing artillery and achieving high rates of fire. Both sides, however, failed to develop the kind of coordinated fire that would make their artillery fully effective in supporting combined operations, although Iraq again greatly improved its performance during 1986-1988. Their command chain often led to long delays in requests for the approval of artillery support. They have not made good use of forward artillery spotters and lack more sophisticated forms of target acquisition. Even the Iranians have been slow to shift fires, and both sides have found it difficult to cross reinforce from one unit to another.

Neither side effectively blended armor, infantry, artillery, helicopters, although both have occasionally made effective use of helicopters. Most branches of the land forces also only cooperated effectively when they fought from well established static defenses, or during the initial assault phase of an offensive. Inter-branch coordination often broke down when a battle has become fluid. Once again, this offers risks and opportunities for the West. There is an obvious need to transfer the skill and mix of technology necessary to help friendly Third World forces conduct combined operations, and it may well be possible to exploit serious weaknesses in the combined arms capabilities of hostile nations.

## ***12.2 Infantry in the Iran-Iraq War***

The Iran-Iraq War provides additional support for the thesis that infantry can still have decisive impact in modern warfare in the Third World. The primary fighting throughout the war was infantry dominated until the Iraqi offensives of 1988. Infantry attacks accounted for most of the changes in the course of the war since its first few months, and most offensive maneuver was infantry maneuver, rather than mechanized, although Iraq often used mechanized maneuver defensively to shift its forces.

### **12.2.1 Iraq's Problems With Infantry**

Iraq was not prepared for effective infantry combat when the war began. In accordance with Soviet doctrine, the Iraqis placed great stress on the use of tanks and mechanized units during the first stages of the war. The initial Iraqi invasion involved brigades and support elements from four armored divisions and two mechanized division. These forces thrust into the Khuzistan region without the support of large non-

mechanized infantry units. However, the presence of a large numbers of water barriers and strong defenses in urban areas provided poor conditions for tank and mechanized warfare. This, coupled to the C3I problems described earlier, delayed the Iraqi advance in the critical early days of the war.

The resulting losses and delays quickly led the Iraqis to reevaluate the need for dismounted infantry troops to support their armor. Iraqi troops, including elite Presidential units, had to rapidly learn urban warfare and open area infantry tactics, and this took time. The lack of sufficient trained infantry to take built up areas was particularly critical in the area around Khorramshar and Abadan.

The Iraqis made a massive effort to create new infantry units after their initial reverses in 1980. Reserve forces were mobilized, and hundreds of thousands of "Peoples Army" militia were called up throughout 1981, eventually reaching a total strength of 400,000 to 650,000.

These troops were organized into 1,000-man infantry brigades, but the initial level of leadership and training for the new "Peoples Army" units was poor.

The Iraqis were clearly aware of this problem, and many such units were used as a garrison troop assigned to rear area duties, or to secure what were thought to be low priority areas.

This helped free more Iraqi experienced troops for duty at the front, but as Iran increased its own weight of infantry, Iraq had to send poor quality People's Army units to man its front line defense positions. This helped lead to several Iraqi defeats in 1981 and 1982, and led to broad criticism of the Iraqi infantry as ineffective and lacking in courage. Such critics often relied on exaggerated reports of executions or desertions, however, or exaggerated the meaning of the harsh warnings about desertion broadcast over Iraqi radio and television.

After the first few months of the fighting, Iraq only experienced problems with its infantry force when it was forced to rely on its newly-formed volunteer units to bear the weight of a main Iranian thrust. These "People's Army" units were usually led by senior members of the Ba'ath, rather than professional officers. They were not properly organized, led, or equipped for intense combat, and began to surrender or collapse without being defeated in detail. Their failures helped permit many of the Iranian breakthroughs after early 1981, and they were also the source of many of Iran's prisoners of war. After this period, the People's Army units were given proven combat leaders and became far more effective.

Iraq had fairly effective defensive infantry forces after 1982-1983, but only really began to train large numbers to support counteroffensives in 1984, and this training only began to be fully effective in 1986-1987. It was only in 1988, that Iraq showed it had properly developed its infantry into an aggressive combat arm. In prior years, it tended to rely on complex static defenses, and rarely patrols aggressively in the mountains, marshes, and rough terrain. This may have been intended to minimize casualties, but it

has often allowed Iranian infantry to infiltrate and penetrate Iraqi positions. Iraq has also tended to remain road bound and has failed to patrol rough country using the larger infantry units necessary to secure such territory.

This Iraqi experience provides important lessons for any force designed to fight in low level war, particularly forces which cannot be tailored to a given terrain or contingency. Infantry must have the training, firepower, and sensors to operate aggressively and as a maneuver force in rough terrain, in mountain areas, and in built-up areas. Barrier defenses are a way of minimizing the need for manpower, and not the need for aggressive action.

### **12.2.2 Iran's Early Emphasis on Infantry**

In contrast to Iraq, Iran began the war with fewer tanks and artillery pieces than Iraq (See Figure 12.1), and this disadvantage grew throughout the war (see Figure 12.2), because the Iranians have failed to find adequate sources of resupply. This lack of resupply and sustainability reinforced Iran's ideological emphasis on popular warfare, and helped lead it to try to use its larger manpower base to create superior numbers of infantry as a substitute for weapons numbers and technology. (See Figure 12.3)

**FIGURE 12.1 (OLD FIGURE 4.14)**

**THE IRAN-IRAQ WAR: 1980**

The Iranians were able to obtain the weapons to equip light mechanized infantry troops. Hecker and Koch 7.62mm G3 rifles are produced in Iran and were available for use by the army and the Revolutionary Guards. So were large stocks of Soviet style weapons obtained from North Korea, Czechoslovakia, the PRC, and Libya.

According to Iranian Minister of Defense Mohammad Salimi, the Iranians had three production lines for heavy and light ammunition, and two lines for mortar production, in operation since early in the war. Salimi also claimed Iran has the production facilities to repair Katusha and RPG-7 systems, as well as make anti-personnel grenades. These reports seem to be correct and Iran was probably capable of meeting at least half its needs for small and light arms and ammunition. It also could produce and recondition artillery, multiple rocket launchers, and armored personnel carriers.

### **12.2.3 The Steady Improvement in the Effectiveness of Pasdaran Infantry Forces**

In spite of considerable turbulence because of the revolution, the forward command elements of both the regular Iranian infantry and the Revolutionary Guards did well in combat against the advancing Iraqi Army during the initial stages of the war. Their success was partly due to Iraq's failure to exploit its maneuver capabilities, partly due to Iran's ability to draw upon the equipment stocks built-up under the Shah, and partly due to efficient use of water barriers, rough terrain and built-up areas. These natural barriers allowed Iranian infantry to operate effectively even though they operated as a mix of such diverse elements as regular troops, naval cadets, the Revolutionary Guards, and the then largely untrained Baseej militia (Popular Mobilization Army).

As has been discussed earlier, the infantry in Revolutionary Guard units gradually became as well trained as regular army units, and dominated most Iranian offensive action. They were also responsible for a variety of internal security actions, and received far more trust from the regime than the army throughout the war. It is interesting to note that Khomeini's first civilian Minister of Defense went so far as to state that the army had been created by Satan (the Shah) to defend the interests of imperialism and Zionism.

Although the regular army and the Revolutionary Guards supposedly acquired a joint command in 1982, and additional senior command elements were combined in 1986, no full integration ever took place. Problems in terms of joint operations and command coordination again emerged during 1987, and in the fighting in 1988. The Pasdaran, or Revolutionary Guards, also became a major political force. They acquired their own Ministry as well as their own separate budget, recruiting system, intelligence service and public information office. This, incidentally, is another reason why intelligence assessment of Third World forces must focus heavily on the degree of politisation in individual major combat units, and on the political, ethnic, and cultural differences between given units and forces.

**FIGURE 12.2 (OLD FIGURE 4.15)**

**THE IRAN-IRAQ WAR: 1985**

**FIGURE 12.3 (OLD FIGURE 4.16)**

**ARMED FORCES PERSONNEL STRENGTHS**

### **12.2.3 The Strengths and Weaknesses of Iran's Infantry Tactics**

After Iraq shifted to a defensive posture in early 1981, Iran used its "revolutionary" forces to launch infantry-dominated offensives which succeeded in regaining considerable territory. These Iranian assaults also were usually conducted with only limited amounts of tank and artillery support. They succeeded, however, because of Iraq's slow moving and road bound response, and because of (a) Iran's battle-trained leadership, (b) Iran's use of massive initial night attacks that saturated Iraqi defenses and penetrated to the rear, (c) Iran's and heavy use of human wave attacks, and (d) the regular army's ability to provide substantial firepower support at first light. Iraq usually reacted so slowly that the combined Iranian forces were able to seize key waterways, road junctions, and built-up areas and block Iraqi escape or reinforcement. This again highlights the need for night warfare capability to deal with the problems of locating and killing large attack infantry forces, and for the ability to counter infantry infiltration and flanking efforts in all types of terrain.

Iran showed less skill once it began to invade Iraq. Many officers, NCOs and experienced soldiers were casualties, and Iran's religious leaders failed to understand the cause of previous victories. As was discussed earlier, the Iranian offensives of 1982-1984 were characterized by the use of large numbers of infantry and poorly prepared troops using "human wave" tactics to overwhelm Iraqi defenses.

While there were exceptions, the preceding chapters have shown that far too many Iranian attacks were conducted without adequate tactical planning, logistical back-up, heavy weapons or air support. As a result, Iran lost more of its seasoned troops and Revolutionary Guards during the Fall 1982 offensive, and many of its brigades were reduced to two and three battalions in strength. Losses among the elite Guard units were especially heavy. The new revolutionary command also lacked the professionalism to time their massed infantry assaults properly. In addition, they were easier for Iraq to ambush than regular forces.

Iran's infantry also had problems in dealing with special forces missions. Iran did very well in assault and patrol functions, but never developed effective long range penetration and special forces groups. Iraq was able to maintain a relatively stable rear area at minimal cost, except in the north after 1986, when the Kurds provided the equivalent of special forces. It is important to note that in future wars, other Third World states may be far more aggressive in trying to compensate for their lack of armor and mobility by inserting special forces into rear areas.

The re-establishment of firm, well-positioned Iraqi defenses along Iraq's borders was a key factor in limiting Iran's capability. The Iraqis also gained new motivation because they were defending their own territory and could now make good defensive use of their infantry to defend a single set of fixed lines. As a result, the breakthrough tactics of the Iranian land forces and infantry became steadily less effective during 1983 and 1984.

#### **12.2.4 The Limits to "Human Wave" Tactics**

The changes in Iraqi defenses also meant that Iran faced serious problems in making use of its "human wave" tactics. As has been discussed earlier, these tactics can produce lower total casualties than other forms of attacks on well dug-in positions if they are properly executed. The use of volunteers to charge machine guns or walk over mine fields may sound appalling. However, this tactic can make sound military sense as a means of countering fewer, but better, equipped forces as long as: (a) it is not pushed too hard; (b) it takes advantage of night or some other form of tactical surprise; (c) successful penetrations are exploited; (d) attacks are halted if they do not succeed; and (e) the fighting has meaningful and achievable objectives. Such tactics could pose grave problems for USCENTCOM or other Western operations in the Third World.

Iran, however, was so caught up in giving its offensives the character of a "mini-jihad" that it failed to properly organize and control its "human wave" attacks, and then failed to exploit its initial successes. Rather than erode Iraqi forces in a series of carefully calculated blows, Iran attempted massive breakthroughs designed to achieve deep penetrations, and rigidly pushed its attacks forward over broad areas rather than concentrating on exploiting local successes. Iran also failed to halt its attacks after limited gains, and assumed that the righteousness of its cause could substitute for adequate logistics and an effective C3 structure. As a result, Iran suffered serious casualties during the Val Fajr-4 fighting. While the total dead probably did not reach the 15,000 claimed by Iraq, it may well have approached 10,000.

#### **12.2.5 The Implications of Mass Infantry Assaults for Western Power Projection**

This Iranian disaster does, however, provide another warning to the West. It is far from clear that any Western state is prepared to engage in a Third World conflict which would approach such casualties even on the enemy side. The fighting in 1985 through 1987, has made the risks of engaging major Third World infantry forces even clearer. Iran's steadily improving tactics, and more realistic command goals, allowed it to threaten Iraqi forces, although Iraq had far superior weapons, good fixed defenses, air superiority, and a massive "edge" in armor and artillery. The West has generally been fortunate in being able to treat wars in the "Third World" as low level wars, although Korea and Vietnam were brutal exceptions. The Iran-Iraq War shows that infantry-dominated conflicts can escalate to very high levels indeed; see Figure 12.4. Further, it indicated that extensive infantry combat can take place long after a nation loses many of its high technology weapons and assets.

At the same time, it is unlikely that any Third World State can win set piece battles by trying to achieve decisive results with infantry-dominated forces in a combined arms world. Infantry not only have a limited rate and span of advance, they rapidly become dispersed and lose concentration. Unless they are supported by armored personnel carriers and armor, they tend to lose momentum even when they are successful, and an armored opponent has time to concentrate his forces and recover from even a serious breakthrough. This is especially true when the infantry is supported by towed or

relatively static artillery and lacks rotary wing and fixed wing airpower. This gave Iraq the time to concentrate immense amounts of firepower, and while this was often inefficient by Western standards, it was effective in dealing with Iran.

Finally, these lessons reinforce the need for technology which can: (a) provide improved area and direct fire lethality against infantry attacks even in the complex mix of built-up areas, wet terrain, and mountains common in the Iran-Iraq War; (b) allow Western and friendly local forces to have ample warning and combat capability against infiltrating and night infantry attacks; and (c) allow Western forces to bring superior offensive and defensive technology to bear at the infantry and squad level, as well as in the heavier weapons now emphasized in most Western forces.

**FIGURE 12.4 (OLD FIGURE 4.17)**

**THE IRAN-IRAQ WAR;**

**THE THERMOMETER OF DEATH IN MID-1984**

## **12.3 Tanks, Armored Vehicles, and Helicopters**

Tank warfare had an important impact on the fighting from the beginning of the Iran-Iraq War, but never in terms of the kind of maneuver warfare common in European and the Arab-Israeli conflicts.

### **12.3.1 Iranian Armor**

Iran began the war with numerical inferiority. It started the war with only 1,700 main battle tanks and 250 light tanks. It has never been able to correct this situation. As of 1984, this number had been reduced to around 1,000 to 1,150 tanks. Iran procured or captured about 1,000 T-54s and T-55s, 260 T-59s and some T-72s during 1984-1988, but it also took substantial losses. In early 1988, Iran had less than 750 operational Western tanks, even counting large numbers which were not in operational. These included a maximum of 300 Chieftain Mark-3/5, 250 M-60s, and 200 M-47/48s. Many had limited or no operability due to shortfalls in spare parts and a lack of trained maintenance personnel and major workshop capability.

Iran also lost much of the rest of armored mobility, attack helicopters, and helicopter lift. It began the war with about 250 Scorpion fighting vehicles, with Soviet BMPs just entering service in large numbers, with about 325 M-113s, and about 500 Soviet made BTR-40s, BTR-50s, and BTR-60s. Iran's only recent source of Western-made infantry fighting vehicles seems to be EE-9 and EE-11 Brazilian light armored vehicles and BMP-1 Soviet-made APCs/AFVs. Attrition has, therefore, limited the numbers of infantry fighting vehicles that Iran has been able to field.

As of late 1985, Iran had only about 700-950 operational APCs. Although Iran built-up its strength during 1985-1988, it still only had roughly 130 EE-9s, 180 BMP-1s, 500 BTR-50 and BTR-60, and 250 M-113s by early 1988.

These armored vehicles had to be scattered among army units with twice the mobilization manpower of the forces Iran had under the Shah.

Similarly, Iran's army had 205 AH-1J, 295 Bell 214A, 50 AB-205A, 20 AB-206, and 90 CH-47 helicopters in early 1980, and 40 Cessna 185, 6 Cessna 310, 10 O-2A, 2 F-27, 5 Shrike Commander and 2 Falcon fixed wing aircraft. Iran rapidly found that it could not repair or maintain much of its force. By February 1981, less than one-third of its rotary and fixed wing aircraft were operational, and in spite of major efforts to improve the situation and acquire parts on the black market, Iran was down to less than one fifth of its pre-war holdings by early 1988, and much of that force was not operational.

### **12.3.2 Iraqi Armor**

In contrast, Iraq has steadily built up its tanks, other armor, and helicopter strength. In 1979, the Iraqis had about 2,500 older T-55 and T-62 model Soviet tanks. They also had a few (probably less than 100) more advanced T-72 tanks. Even during the

opening stages of the war, Saddam Hussein was aware that these Soviet tank types were individually inferior to those used by the Iranians. In October 1980, he said: "Their (Iran's) cannons are greater in number, their tanks more advanced, their navy can reach long distance targets, and they have better arms."

Iraq had roughly 2,750 tanks in late 1980. In early 1988, it had more than 4,500 Soviet T-54s, 55s, 62s, and 72s, some 1,500 Chinese T-59s and T-69-IIs, 60 Romanian M-77s, and some captured Iranian Chieftains. Iraq had about 2,500 other armored vehicles in late 1980. As of late 1985, Iraq had about 3,000 AFVs, including such advanced systems as the EE-9, EE-3, FUG-70, MOWAG version of Roland, ERC, BMP, BDRM-Z, and the VC-TH with HOT. It had about 5,100 such systems in early 1988, including roughly 1,000 new models of the Soviet BMP armored fighting vehicle.

Iraq still kept most of its helicopters in its air force at the beginning of the war -- which created major problems because of a lack of effective coordination between the air force and forward deployed army units. In mid-1980, it had 35 Mi-4s, 15 Mi-6s, 78 Mi-8s, 18-34 Mi-24s, 47 Allouette IIIs, 10 Super Frelons, 40 Gazelles, 3 Pumas, and 7 Wessex Mk-52s.

In early 1988, it had a strong Army Aviation Corps with 150-200 armed helicopters, including 40-80 Mi-24s with Swatter, 50-70 SA-342 Gazelles with HOT, 30 SA-316Bs with AS-12s, 56 BO-105 with AS-11, and 10 SA-321 Super Frelons with AM-38 Exocet. It also had 26 Hughes 530F, 30 Hughes 500D, and 30 Hughes 300C with light armament. It had 10 Mi-6 Hook heavy transport helicopters, and 100 Mi-8, 20 Mi-4, and 10 SA-330 Puma medium transport helicopters.

### **12.3.3 Armored Tactics and Lessons**

Comparative tank technology and numbers of armored weapons never had anything like the impact on the fighting one might normally expect. Iranian and Iraqi tanks were rarely used effectively. For example, the initial Iraqi armored advance on Abadan was extremely slow. Tanks moved into "hull down" positions prepared by Iraqi engineers. They then waited while the area to their immediate front was saturated by artillery. Only after such saturation fire was finished, did the Iraqi tanks move forward. While these tactics had proved effective against inadequately armed Kurdish guerillas in the late 1970s, they represented a critical mistake in fighting a more formidable adversary such as Iran.

Iraqi armor moved too slowly until the Iraq's 1988 offensives, and Iraq failed to use its armor to engage in aggressive strikes against Iranian lines of supply and communication. The Iraqi use of tanks as mobile artillery also created severe problems with tank barrels, which rapidly wore out under constant use. Iraq was still exhibiting this problem during its defense of Faw in 1986 and defense of Basra in 1987.

Iraqi armor also did poorly in the intensive urban fighting that followed its initial invasion of Iran. Iran tenaciously defended sheltered urban positions, like Khorramshahr, Abadan, Ahvaz, Dezful and Susangerd, using rocket launchers and ATGMs. The Iraqis

were totally unprepared for urban warfare, and this led to major Iraqi losses. These losses included both armored and infantry troops, but Iraq experienced its most serious problems in trying to use tanks in urban areas. Iraq could not exploit its armor at short ranges or provide protection against RPG and ATGM fire.

Iraq's Soviet-built T-55 and T-62 tanks were, however, reported to be surprisingly survivable against Iranian helicopter gunships during the period when Iran was still able to employ its helicopters in large numbers. Iraq mounted 12.5 mm machine guns on its tanks to fend off hostile helicopters. These tank-mounted guns have relatively long range, and they helped prevent Iranian helicopters from operating within lethal missile range, after the Iraqis learned to organize cooperative and anti-helicopter fire. The Iraqis also claim that they have occasionally used the main guns of their tanks to destroy Iranian attack helicopters.

The Iraqis did suffer serious armor losses when Iranian helicopters have flown nap-of-the-earth and pop-up attacks, but these attacks were rare after the first few months of the fighting. At least part of Iran's problems in using attack helicopters seem to have been caused by the disruption of its C3I system and command structure, and a tendency to employ small unit tactics without a clear overall knowledge of the battlefield.

Turning back to armor, the Iranians gradually deployed nearly all of their functioning heavy armor during the first year of the war. As the war progressed, Iranian units could not obtain resupply of their tanks and OAFVs, or effectively recover and repair their armor. Iranian armored forces continue to dwindle in size, and their attrition rate was compounded by a number of Iranian blunders.

One example of these blunders occurred in the first major Iranian counteroffensive of the war: three under-strength Iranian tank regiments from the regular army attacked Iraqi troops at Susangard on 5 January 1981, without infantry support and were soundly defeated. The tank units were part of the regular army, under the command of then President Bani-Sadr, and this lack of infantry support seems to have resulted from Iranian internal politics. The available infantry were units of the Revolutionary Guards, which were not under Bani-Sadr's command. Bani-Sadr either deliberately tried to demonstrate the strength of the regular army by sending unsupported tanks forward, or Iran's religious leadership withheld the Pasdaran infantry.

Bani-Sadr also overlooked the fact that his ground of attack was a sea of mud that critically inhibited Iranian ability to conduct resupply. Further, Iranian armor failed to maneuver quickly when it entered the "killing zone," which had been created by well dug-in Iraqi tanks and infantry. As a result, Iraqi forces were able to surround the Iranian forces on three sides, and to force the Iranians to abandon many of their armored vehicles because they could neither refuel nor resupply them.

This tank firefight was typical of many armored battles in the Iran-Iraq War -- and of Third World armored battles in general -- in its lack of accuracy, maneuver, and long-range fire. Several reports agree that in spite of the fact that both sides usually fired at ranges under 1,000 meters, and that the firing was often limited and heavy, and goes on

for some time, losses were normally limited. Many of the Iranian losses in the January 5, 1981 battle occurred because of Iranian inability to maneuver and to resupply in the mud. Iranian armor was not so much defeated by fire, as stuck and then abandoned. It is also clear that Iraq showed no ability to exploit its victory and counterattack. Israel has regularly exploited such weaknesses in Arab forces, and they provide an important lesson regarding the vulnerability of armor in Third World threats and allies.

Iran did better after Bani-Sadr's ouster in June 1981. It used remaining tanks and supporting armor more flexibly than Iraq during the campaigns that drove Iraq out of most of Iran. These battles were infantry-dominated campaigns, however, and other armored fighting vehicles (AFVs) and helicopters did as much to support the Iranian offensives as tanks. Iran also took heavy tank losses during 1983 and 1985 that it could not replace. As a result, Iran tended to use tanks largely as artillery or to support infantry, rather than in independent maneuver actions.

Iran did managed to obtain the North Korean and Chinese T-59 and Soviet tanks listed earlier, and some modern T-62s and T-72s from Libya or Syria.

Iran did not demonstrate the ability to use these tanks effectively in maneuver warfare, but found that they generally performed as well as Western types in support roles. While they lacked the fire control systems to achieve a similar first round kill probability, or to fire on the move, their guns lasted longer and direct fire sighting was simpler than operating the sophisticated sight and fire control systems needed for tank vs. tank combat.

Tank warfare in the Gulf rarely took advantage of the more advanced features of modern tanks, including fire control and range finding equipment. Numbers generally proved more important in combat than quality, and appraisals of the value of given technical features were often contradictory. For example, the Iranians expressed a preference for the M-60 when they needed mobility, but for the Chieftain when sheer weight of armor was critical.

#### **12.3.4 Other Armored Vehicles**

The patterns in the fighting involving other armored fighting vehicles (OAFVs) were somewhat similar to those in tanks. Iraq fielded a large number of infantry fighting vehicles at the beginning of the war, but it failed to properly maneuver, and either had to dismount its infantry or take heavy losses.

Iran did little better in using its AFVs, and its inability to obtain a significant number of new tanks was matched by its inability to obtain infantry fighting vehicles. In fact, neither side fought or maneuvered its AFVs much better than it fought its tanks.

As a result, the main lessons that emerge from Iran and Iraq's experiences with armor have little to do with the technology, armament, or design details of individual vehicles. They are more consistent with the lessons from Arab behavior in the recent conflicts between Israel and its neighbors, and with the weaknesses in Iranian and Iraqi

combined arms discussed earlier. The limited ability of Third World states to drive, service, and operate armored vehicles in peacetime does not mean such states have the ability to operate armor effectively at the maneuver level, although armor often gives Third World forces far more effectiveness in holding prepared defensive positions that cannot easily be outflanked or bypassed.

The problem for the West is to (a) provide friendly local forces with the training and technology necessary to support large scale maneuvers, (b) to persuade them to invest in training, recovery, and sustaining capability, rather than tank and armor numbers or the latest "glitter factor" in tank technology. Western forces also need to stress maneuver and avoid direct encounters with positioned Third World armor.

### **12.3.5 The Impact of Attack Helicopters on Armor**

Iran never achieved the tactical results the Shah had sought in creating a massive force of attack helicopters. By the time the war began, Iran had already lost much of its operational capability and the remaining capability declined steadily during the first years of the war. Iran often used helicopters effectively in small numbers, but never as a major force.

Iraq was able to increase and sustain its helicopter strength, but was never able to fully overcome severe problems in using its helicopters as an extension of its armor and land force strike capabilities. It tended to use helicopters for more than the most narrow tactical purposes, often deploying them like forward artillery at the battle front or FEBA and firing at advancing Iranian troops.

Iraq rarely used helicopters to strike deep, or to insert troops into the rear. Like Iran, it would not usually risk deep helicopter attack strikes into the defend rear areas behind troops. Iraqi forces also indicate that they had serious problems with target acquisition. Pop-up tactics often worked against armor, but they do not seem to work well against dug-in or scattered infantry heavily equipped with automatic weapons and manportable surface-to-air missiles.

As a result, Iraqi pilots often found it difficult to acquire enough targets to merit risking the helicopter in combat, and to survive long enough to acquire and attack other targets in the rear. Their problems were compounded by an inability to fly and fight at night, and to easily acquire and kill targets in mountain areas, marsh areas, and built-up areas. The need for helicopters to have effective night combat capability -- and to be able to search out and kill infantry targets under a wide range of very demanding conditions -- is another major lesson of the war.

This indicates a similar emphasis on training and sustainability will be essential wherever Third World forces use helicopters. Tactics and systems which are heavily optimized against maneuvering armor may fail to meet the real world tactical needs of war in the Third World. Emphasis will also be needed on survivability, the use of helicopters to support war in unusual terrain and built-up areas, the ability to acquire and kill dug in or well positioned infantry, overall command and control in using helicopters,

use of helicopters against infiltrating infantry, and use of helicopters in support special forces.

Given the deployment problems that USCENTCOM and other Western forces face in massing heavy armor, the best substitutes for mass would seem to be combat helicopters, and the use of smart submunitions that aircraft and MRLS can use in killing enemy tanks without direct fire. At the same time, sensor systems like SAR, SLAR, and FLIR, and area munitions, may need to be modified to locate and kill dug-in tanks, armor, and infantry rather than maneuvering forces of the kind more likely to be encountered in a NATO-Warsaw Pact conflict.

## **12.4 Precision-Guided (PGMs) Weapons and Specialized Land Munitions**

Precision-guided munitions played an important part in the Iran-Iraq War from its beginning, although many of the systems used were comparatively old, and the war was not been a major test of tactics or technology. The experience of both sides confirmed the fact that anti-tank guided weapons can play a major role both in countering armor and in dealing with a wide range of strong points and hard targets.

### **12.4.1 Iran's Use of ATGMs**

Iran had to make heavy use of ATGMs to conserve its armor and air resources. The Iranians have been able to use large numbers of U.S. PGMs, TOWs (BGM-71A) and Dragons (M-47), and French ENTACS, SS-11s, and SS-12s. It used weapons purchased by the Shah, obtained new ones from the world arms market, and obtained more TOWs as the result of cover U.S. arms sales.

Iran made particularly heavy use of TOW ATGMs during the first year and a half of the war, many of which were fired by crews from vehicles and from Cobra helicopters. It used them offensively against Iraqi bunkers, mountain defense positions, urban targets, and dug-in tanks. TOW units were often infiltrated forward in attacks or in mountain warfare. When Iran was able to obtain arms covertly from the U.S. during 1985-1986, it gave heavy priority to obtaining of TOW. Iran seems to have use such weapons against both Iraqi tanks and hard points during its attack on Faw in 1986 and its counter-attack in Meheran later that same year.

Iranian ground troops also used Dragon missiles and, occasionally, ENTACs and SS-11s. Both the TOW and Dragon missiles were effective in helping to halt Iraqi tanks, but Iran rarely achieved more than a 0.1 hit probability. It needed 3 to 4 times more missiles per TOW launcher than it had bought under the Shah, and shortages rapidly developed. Part of these problems may have resulted from training and operating problems, but many resulted from the fact that Iran found that it was often forced to use large numbers of missiles under conditions where it was not possible to wait for a target opportunity with a high probability of kill.

Like Egypt in the Sinai in 1973, high rates of fire were more important to halting

maneuver than high rates of kill. This is an important lesson for the West, which may have to employ such weapons against a major Soviet superiority in armor and in terrain that often shields tank and other armored targets.

After 1982, Iran's lack of missiles, and the slower pace of a more static war, led to lower rates of fire and more precise targeting. In fact, at least 50% of the ATGM targets on both sides were static or dug-in tanks or hard points, rather than maneuvering armor. This made warhead size and range critical performance factors in many tactical situations.

Shortages forced Iran to diminish its use of TOW and Dragon, and led Iran to obtain Sagger and other Soviet-made anti-armor missiles and rocket launchers from North Korea, the PRC, Syria and Libya. They also led Iran to place heavy emphasis on getting more TOW missiles in its black market purchases and covert purchases from the U.S. Iran seems to have used the TOWs it obtained from the U.S. during its counterattack at Meheran in 1986, and attack on Basra in 1987.

#### **12.4.2 Iraq's Use of ATGMs**

Like Iran, Iraq never claimed high kill probabilities from any type of ATGM. Iraq fired 6 to 8 Milan and HOT missiles per vehicle hit, and Iraq only scored about one hit per 20 to 30 Sagger or SS-11 missiles fired, although this may be more a function of tactics and training than technology. Further, the Iraqis would like ATGMs with more capability against infantry targets and bunkers, and note that they would like advanced manportable mortars and grenade launchers. The need to provide forward infantry troops with heavier and longer range firepower is a major lesson of the war.

Some additional insights regarding ATGMs which emerge from the Iraqi side, are:

- Far more weapons are fired for effect than with a real hope of hit or kill. About three to four times as many ATGMs and rocket launchers are fired for "harassment" as are fired with a good hope of a kill.
- Many weapons must be fired from within buildings or relatively closed defensive positions.
- AFVs are too vulnerable for use in firing ATGMs. Dismounted and concealed infantry weapons are far more desirable.
- ATGMs must be usable at ranges as short as 100 meters in the open and at very short ranges in cities and urban areas.
- As many ATGMs and rocket launchers have been fired at static defensive, mountain and urban positions as at armor. These are the primary hard target kill weapon of land forces.

- Effective night vision has generally been lacking in the ATGMs available to Iraq, but would be highly desirable, particularly if an area warhead, as well as anti-armor, were available.
- Weapons with simple sighting, tracking and fire control are essential. The complex method of tracking both the missile and target used in most Soviet missiles greatly reduces effectiveness.
- Both launcher and missile numbers are critical. ATGMs and rocket launchers must be provided throughout the force and to rear area and support forces.
- Rocket launchers remain a critical weapon in spite of ATGMs. It would be highly desirable to have an area of anti-infantry rounds available for such systems to supplement light mortars and machine guns.

### **12.4.3 Rocket Launchers**

Ordinary rocket launchers have also played an important anti-armor and infantry support role. The RPG-7 was employed by both sides, and was effective in close combat against the treads or other vulnerable areas of all of the tank types engaged. According to the Iranian Minister of Defense, the manufacture and repair of RPG-7s is now being carried out on a large scale by Iranian workers. By this, he may mean that used launchers are being refitted to fire new grenades. Iran may, however, be able to produce RPGs, just as it presently produces heavy and light ammunition and its own mortars.

Given combat conditions and the quality of the data available from interviews and written sources, it is not possible to draw detailed comparative lessons about the effectiveness of specific types of precision-guided land weapons or any other type of anti-tank weapons. Neither side has been realistic enough about its claims to indicate relative kill capabilities and effectiveness. It is clear, however, that both sides prefer "third generation" Western guidance systems (sight-on-target-only) to the awkward and complex first and second generation guidance systems (sight on both missile and target to track) of Soviet ATGMs.

## **12.5 Tube Artillery and Multiple Rocket Launchers**

Neither Iran nor Iraq had the command structure, training, targeting, artillery sensors, and fire control, and C3 capabilities to conduct effective point fire, counterbattery fire, on-call fire, or the "switched fire" of modern military forces -- although Iraq again made major improvements in its capabilities during 1986-1988. Both sides of the Iran-Iraq War have made area bombardment their normal method of using artillery, and have relied on maps, line of sight, or pre-surveyed fire for most of their target acquisition.

### **12.5.1 Iraq's Use of Artillery**

The Iraqis used mass artillery fire ever since the intensive urban fighting in

Khuzistan's major cities. Prior to sending their infantry into these areas, they made hour or even day-long efforts to "soften up" urban defenses with long-range artillery. The results were not impressive in this fighting, since the resulting rubble often provided a more formidable defense than urban structures, and few Iranians were killed. Mass barrages were generally equally unimpressive in other fighting, with the exception of fire against exposed mass infantry attacks.

Iraq also tried to use artillery warfare against urban targets to force the Iranians to make concessions, and then to try to force them into agreeing to a cease-fire. It was in this context that Saddam Hussein warned the Iranians that his country would "sledgehammer your heads until you recognize our rights."

This type of "sledgehammering" was sometimes directed at military targets, but largely included economic targets and population centers which were targets that did not require precision bombardment.

Iraqi artillery, for example, helped destroy the oil refinery at Abadan during the initial part of the war. The Iraqis used their long range artillery pieces (such as the 130 mm guns) to fire sporadically into urban centers and rear areas. This was done to disrupt military operations or civilian work rather than to inflict casualties. In describing the use of artillery at the Gzuyl sector (northeast of Basra) during 1984, one journalistic source reported hundred of thousands of dollars worth of ammunition being used per hour. Artillery was fired as frequently as every two seconds.

During 1984-1988, however, Iraq became increasingly more effective in developing the capability to deliver massive amounts of fire on advancing Iranian forces, in developing some counterbattery capability, and in shifting fires. Iraq also steadily increased its forces of self-propelled artillery and its ability to use artillery movement in support of armor and infantry. While Iraq never achieved the level of combined arms capability common to most Western and Soviet-bloc forces, it was able to substantially improve its performance and this was an important contribution to its victories in 1988.

### **12.5.2 Iran's Use of Artillery**

Iran has made extensive use of artillery, but was much slower to organize the mass fire it needed to be effective. In describing early fighting in Susangard, for example, the Iranian PARS news agency stated that the Iraqi success in attacking the city was due to Iran's own "lack of artillery support."

This lack of artillery support for Iranian units in the early part of the war was more a matter of organization than resources, and may have been the result of heavy purges in the technical services of the army (including the artillery).

The Iranians have since used massed firepower against targets like Basra and Iraqi defenses in much the same way as Iraq, although they could never approach Iraq's strength in numbers. They never relied upon sophisticated target acquisition, although this was partly continuation of the policies of the Shah's military. A senior British officer

who was in overall command of a number of troops, including an Iranian brigade during the Dhofar campaign, went so far as to criticize what he called "a tendency to apply massive resources" without bothering to find a target in terms of artillery.

Iran's most useful tube artillery weapons for such fire have been the 130 mm M-46 gun, 175mm M-107 gun, and 203mm M-110 howitzers. Iran has also favored the 130 mm gun, but has used Soviet 122mm D-74 gun and 152 mm and 155mm gun-howitzers as well.

### **12.5.3 Lessons and Technical Issues**

In spite of various news releases, both Iraqi and Iranian officers in the field realized they often failed to use massed artillery to achieve serious casualties. However, the both the Iranians and Iraqis found the disruptive effect of random and mass artillery shelling to be useful. They have often fired at civilian facilities and rear areas for political or shock effect, and with little interest in inflicting casualties.

The "blind fire" techniques both sides used during most of the war proved to have significant limitations. The most important limitation was that both sides' artillery arms were often unresponsive to the real time needs of the maneuver elements. While there has often been massive pre-assault fire, artillery rarely furnished effective direct or "creeping barrage" artillery support for maneuver units as they have advanced. Most pre-planned fire ignored detailed terrain and maneuver considerations, and most artillery kills were achieved against exposed infantry attacking in mass during daylight when independent artillery units could target on a line of sight basis. Artillery was not been used effectively to deal with unexpected problems or fluid battlefield situations, although Iraq is now making far more effective use of rapidly deployed self-propelled artillery to deal with Iranian attacks.

Both sides found every kilometer of artillery range to be of great value in reaching such targets. Both sides LAO preferred to use multiple rocker launchers for such missions when the proper combination of launchers, range, and ammunition has been available. Iraq had had good access to high volumes of MRL fire since the war began, but Iran was slow to acquire the number of MRLs it needs and experienced erratic and limited ammunition supply as late as 1987.

Iraq made heavy use of the Soviet BM-21 122 mm, ASTOS II 127 mm, BM-13/BM-16 132 mm, and BM-14 140mm multiple rocket launchers, and Iran has used PRC and North Korean Type-63s and BM-21s.

The 122mm multiple rocket launcher has proved to be a particularly effective weapon. One observer, describing the Iraqi side of the front in November 1982, stated: "Rows and rows of tanks and mobile rocket launchers face east, dug in behind earth ramparts."

This use of MRLs is in agreement with Iraqi doctrine which stresses the use of artillery against area rather than point targets. Iran has given high priority to acquiring BM-21 122mm multiple rocket launchers. Both sides have also made extensive use of mortars,

largely in direct support of infantry or forward barrier positions.

Both Iraq and Iran complained about artillery and MRL fuzing failures against wet and marsh terrain, and against hard rocky areas, and of failures in Soviet designed proximity fuzes. Iraq also has complained about the failure of Soviet artillery fire control and targeting systems, and has aggressively sought European technology. It is impossible to determine whether these failures are the result of technology, training, tactics, or handling. Western studies of Soviet fuzing do indicate, however, that the Soviet munitions exported into the region had relatively unsophisticated fuzing. At the same time, even the U.S. Army has been slow to procure the kind of reliable, variable sensor and setting fuzing necessary to achieve high lethality under these combat conditions.

It is clear that both sides would greatly benefit from the ability to properly target their systems and accurately deliver surge fire in near real time. Reliance on barrages, area fire, and fire for effect, is the product of inadequate technology, as well as inadequate training and doctrine. Both sides also recognize that the use of tanks as direct fire artillery is wasteful, but cannot solve the C3I/BM problem of bringing in artillery fire on a friendly position. These needs have obvious implications for Western and friendly local forces.

## **12.6 Mines and Barriers**

More intensive use has been made of barriers and barrier munitions in the Iran-Iraq War than any of the other conflicts examined in this study. The Iranians were the first combatants to make extensive use of mines and barriers since they were initially on the defensive. They made particularly good use of deliberate flooding in the south to channel the Iraqis along a few routes of advance in the low-lying areas, and forced Iraq into massive engineering effort to create new roads and lines of communications. The Iranians also used water barriers to disrupt and delay the Iraqi advance on Abadan.

Iraq initially concentrated on building forward barriers to defend its gains and reduce the need to deploy forces to defend its lines. It did not, however, build major fixed defenses until 1981-1982. It concentrated on building up a limited number of improved roads. This made Iraqi forces vulnerable when Iran recaptured any given road link, and reduced Iraq's ability to retreat.

Iraq did make massive use of flooding, water barriers, fixed barrier defenses and mines, however, when Iran forced Iraq to go on the defensive. By the time Iraq was forced to pull back to its border with Iran, it fully realized the risk of defeat by the advancing Iranian troops. This led Iraq to create fortifications linked by a vast network of roads along its entire front. Iraq steadily improved this system after 1982, and made progressively greater use of dikes, dams, and flooding to create water barriers.

Iran's lack of technology for breaching Iraq's extensive mine and barrier defenses may have helped save Iraq during the most successful phase of Iran's offensives. The effects of Iran's shortages of armor and insufficient artillery were made far worse when Iranian infantry had to penetrate barrier defenses. Iraq also used earth barriers and

artificial ridges to reduce the vulnerability of its rear areas to air attack during 1981 and 1982. These barriers were heavily defended with AA guns, and limit low altitude attack capability against key targets, although their effectiveness has not been fully tested because they were only completed after Iranian operational air strength declined.

The Iranians seem to have been uninterested in technological solutions for defeating these barriers and land mines, and are reported to have used troops to detonate mines by jumping upon them or using sticks to facilitate their explosion.

There are major problems with many of these stories, however, and some can clearly be dismissed as Iraqi war propaganda.

The Iranians did, however, steadily improve their infiltration capability since 1984. While the Iranians often used "human wave" tactics, they were usually careful to scout out lines of advances, to take advantage of weaknesses in the Iraqi positions, and use the cover of terrain or night to try to penetrate Iraqi lines. , Iranian patrols often spent weeks scouting out mine fields at night and to use sappers to penetrate the fields at night ahead of attacking troops. The Iranians exhibited an outstanding ability to use engineering equipment to cross water barriers and assault mountain defenses in 1985 and 1986.

It is unclear that advanced technology would have been successful in stopping these Iranian tactics. As the PRC demonstrated in Korea, and the Viet Cong in Vietnam, there is nothing inherently wasteful about using "human wave" tactics to attack prepared positions as long as the initial losses are minimized by careful planning and tactical surprise. In any case, the West may well face similar problems with both enemy minefields and barrier defenses, and mass assaults. It must be able to both create its own barriers and penetrate those of others.

Mines and barriers have been as important as Iraq's superior weapons strength to maintaining Iraq's defense. Iraq also steadily improved its use of defensive lines and barriers as time went on. Iraq steadily expanded the length of its defenses along the front. It also created extensive concrete tank and anti-personnel barriers at the first defense line to improve on its former earth mound defenses.

Iraq created several lines of barrier defenses around key objectives like Basra as early as 1984, but it generally had relied on one strong line backed by extensive rear area logistic and firepower support. Iraq's defeat in Faw in 1986 then led it to shift to defenses with several parallel road lines, and with high capacity lines further in the rear. It also further improved an already high inventory of tanker transporters. After the Iranian attack on Basra in 1987, Iraq shifted from strong initial forward defense barriers to the extensive use of defense in depth. All of these improvements had a significant effect in allowing Iraq to counter Iran's human wave assaults.

It is important to note, however, that each side's barrier defenses were only effective to the extent they were actively defended. They did not act as force multipliers or as substitutes for troops and active defenses. Iran demonstrated on many occasions

since 1984 that it could rapidly infiltrate and penetrate strong barriers when they are lightly held and defended -- a problem the Soviets experienced in Afghanistan, the Argentines in the Falklands, and Iran itself experienced during its defense of Faw in 1988. This is an important lesson for the West, since many advocates of barrier defenses see these as force multipliers, rather than as a limited extension of the capability of forces in being.

## **12.7 All-Weather and Night-Target Acquisition Systems**

All-weather and night-target acquisition systems were not available to either side during much of the war, but would have been important assets. This was particularly true in the case of Iraq, since a combination of temperatures up to 120o F during the dry season, and Iran's lack of heavy equipment, helped lead Iran to start large numbers of night battles. The Iranians developed night attack capabilities using tactics and techniques dating back to World War I. They relied on scouts, patrols, careful preparation, special training, and complex attack plans and schedules. They make little use of advanced technology.

The Iraqis recognized the importance of night warfare early in the war, but it appears there was little they could do to quickly improve their capabilities. Some Iraqi officers claim that the Soviets failed to provide them with advanced night vision or fire control systems. Iraq, however, did not have the proper organization and communications equipment at the start of the war to use forward observers to call for artillery fire on point targets. Iraqi forces also had little pre-war training for daytime artillery direction, and virtually no training for night combat.

Night vision aids were slowly introduced into Iraqi and Iranian forces, but target acquisition remained a problem for both sides. They had no long-range or BVR ("beyond visual range") capability other than a limited number of recon aircraft, using day and IR photos, and a few artillery locating radars. Neither source of data could provide adequate and timely information.

The Iraqi deployment of night vision systems was also somewhat strange because Iraq issued many of its initial deliveries of night vision systems to security units in cities and in the rear although there was no real threat in the area. Iraq stepped up deliveries of night vision devices to the front in 1986 and 1987, but even in 1988, there were reports of shortfalls and a failure to provide anything like the number of night vision devices and sights that were needed at the forward combat unit level.

Both Iraq and Iran made slow progress in improving their fire control and night and all-weather capability to use artillery. Both sides had artillery radars and counter-battery targeting aids, but Iran never seems to have been able to use them effectively. It relied largely on line-of-sight and classic visual counter battery techniques, and area fire, particularly as it became steadily more dependent from static Soviet or PRC-made towed artillery.

The accuracy of the each side's artillery fire increased after 1982, but this often

was due to the stationary nature of the war. Iraqi and Iranian forces did not improved their targeting technology, but made better efforts to survey the battlefield, to put in aiming stakes, and plot their barrages in advance to cover possible avenues of approach. In addition, the Iraqis showed increasing ability to integrate artillery support into overall defensive planning, and to begin using forward observers to call in fire. There is no question that both sides would have been far more effective in using their artillery if they could have combined modern fire direction technology with more advanced targeting systems.

## **12.8 Logistics and Logistical Systems**

Iraq seems to have carefully considered the logistic implications of a war with Iraq well before the fighting actually started. Ammunition, water, gasoline, oil and lubricants sites were constructed throughout the corps areas where they would be most needed. The Iraqis also did their best to maintain a logistic pipeline that would give commanders freedom of action once the war was underway.

When the Iraqis were in Iran, they constructed a paved highway from the southern sector, through Ahvaz, then north to Dezful. Since they have gone on the defensive, miles of lateral roads have been built behind the front in Meisan province, and then throughout much of the central and southern front. Many lateral roads have also been improved. These roads were built in order to enable combat reserves to move quickly into position to deal with any Iranian threat.

Another line of up to six lane highways, further in the year, has been rushed into completion. This seems to be in response to the the Iranian victory at Faw in 1986, and the siege of Basra in 1987.

The Iraqis made logistic oversupply a key operational principle. They operated on the Soviet system of "supply push", rather than the U.S. system of "demand pull". Iraqi forces at the front were given massive ammunition stocks and war reserves. For example, Iraqi guns fired over 400 rounds per day in checking Iran's break out of Faw in early 1986. While the data are uncertain, Iraq routinely seems to expend about one U.S. Army "week" of munitions per weapon per day when it is in intense combat. Put differently, Iraq expended about as much ammunition per gun per week in early 1986 and 1987 as NATO countries have per gun in their entire inventory.

The Iraqis also used tank transporters to move their armor to the front, and used them to eliminate many non-combat related maintenance problems. The improvement of this aspect of Iraqi capabilities was quite dramatic. The Iraqis have expanded their inventories from about 200 tank transporters in 1973, to approximately 1,200 in 1984, and 1,700 in 1988. They also are reported to be in possession of a large number of transports for AFVs.

The large and ponderous Iranian logistical system the U.S. constructed under the Shah, perished with the departure of the thousands of American advisors who operated this multi-billion dollar operation. Contrary to many reports, it was never really

computerized, and was run largely by U.S. and U.S.-trained technicians who were more concerned with storing supplies than the possibility they might have to be used. Iran had computers and computer-coded supplies in its logistical system, but no records or software to locate many items. As a result, logistic supply had to be carried out at a rudimentary level once the war began. This was particularly ineffective in supplying complex spare parts for aircraft, tanks and vehicles.

Iran's logistical problems grew steadily after the start of the war. This was partly due to a lack of transport vehicles for rough terrain, but largely due to shortages in war material. The general shortages which permeated the country also had an impact on the frontline troops. Shortages of gasoline and motor oil sometimes led to a paralysis of resupply efforts since the vehicles designated to bring supplies to the front were affected by these shortages.

One of the most notable problems associated with Iran's logistic and support effort was the large number of Iranian tanks abandoned by their crews during the first part of the war and in 1988. Many of these tanks had no real damage, but were left behind because of an Iranian inability to resupply them or deal with minor repair problems. The tanks were subsequently seized by the Iraqis who presented about 50 of them to Jordan in early 1981.

Others were retained by the Iraqis, who received training in the use of Western technology from Jordan.

Another Iranian logistical problem, that was apparent since the early stages of the war, has involved the British-made Chieftain tank. The Shah acquired 800 of these main battle tanks, and they formed the key component of the Iranian armor corps. At one point, Iran had more of these British-made tanks than did Britain. The Chieftains sent to Iran, however, have proved to have underpowered engines for rough terrain in warfare, inadequate filtering and cooling, and complex electric current and gun drive systems without hydraulic back-up. The Chieftains are particularly susceptible to overuse and breakdown. They require a very high degree of maintenance time, which is further complicated by Iran's lack of spare parts. The U.S. M-60 has also experienced rapid engine wear, and major track life problems in Iranian hands, but has proved easier to service and repair than the Chieftain.

Iran's resupply problem was partly solved by the massive PRC, North Korean, and other arms deliveries described earlier, but Iran's ability to keep its Western-made systems going got steadily worse. Iran had to buy in small lots of mixed quality. It had no real system for allocating parts and munitions to meet key needs, and often delivered spares in small or random lots. Parts were often distributed by item, rather than in the mixes needed. Ammunition was over-supplied and wasted in one area and under-supplied in another. While reports are uncertain, Iranian stocks may have sometimes dropped so low that Iran seems to have had critical problems with ammunition supply.

Some aspects of Iran's experience in logistics and technology transfer bear an unfortunate resemblance to that of South Vietnam, which could not operate the complex

logistic system it inherited from the U.S. This argues for a Western emphasis on giving friendly Third World states simpler and low technology logistics systems, and for Iraq's emphasis on large numbers of well distributed stockpiles, rather than centralized systems.

Such an emphasis should aid friendly states to cope with the Soviet emphasis on supplying its clients with massive weapons stockpiles, should aid Western forces in joint operations with friendly local forces, and would minimize the need to devote scarce strategic mobility assets and limited Western munitions reserves to emergency resupply of a Third World state.

## Footnotes

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oviet designed proximity fuzes.

Iraq also attempted to improve the lethality of its multiple rocket launchers by developing a 12 or 16 tube, computer-controlled launcher, that fired rounds with a cluster bomb warhead. This warhead had a diameter of 262 mm, and a proximity fuse that released 200 bomblets about 150 meters above the target. This weapon was called the Ababil (a Koranic firebird). It was used during the latter stages of the war, but its effectiveness is unknown.

Jane's Defense Weekly, October 29, 1988, p. 1045.

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