

MISSILES AND AIRCRAFT (PART 2)

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To understand the significance of air weapons and their effectiveness, you have to look at the situation at the close of the October War and extrapolate ... The SAMs were totally destroyed and the air force could do whatever it wanted against the ground.

— Israeli General¹

The previous article contained an historical introduction to aspects of air doctrine that were significant in the Yom Kippur War: ground support, electronic warfare, missiles, pre-emptive strike, air defence systems and overconfidence. Interpretations of the Yom Kippur War were mentioned:

1. That the role played by air power, (that is aircraft), was important.
2. Control of air space over battlefield areas, (either by possessing it by aircraft or denying it by an air defence system), was vital.
3. Newer, more advanced weapons obtained by the Israelis towards the end of the conflict caused the outcome of the war to change decisively in their favour.
4. Arab ground operations were greatly influenced by their preoccupation with using a 'missile umbrella' to control the air.

The opinion of the Israeli general quoted above is not shared by all commentators. Major-General A.H. Farrar-Hockley provides a contrasting view: *'But, if current observations are anything to go by, there is a danger that the IDF may fall back on the notion that, after all, its old tactics of the predominantly open, purely armoured battle, in co-operation with the air, won the day. In fact, they came close several times to losing it.'*²

Another factor also outlined in the last article, was the Israeli Air Force's aircraft losses: the initial heavy losses (50 in the first three days),³ as opposed to an overall loss rate of 'one per 100 sorties in 1973.'⁴

A study of these viewpoints has shown that much of the evidence used to draw these conclusions comes from different stages of the war. Analysts proclaiming that the aircraft is dead generally point to the successful use of the Egyptian and Syrian air defence systems in preventing effective Israeli

Air Force ground support operations — in the opening phases of the war. The Israeli Air Force's initial heavy aircraft losses are also quoted in this context: events of the first three days of the war.

Those that maintain that the Yom Kippur War proved the role of the aircraft, point to the situation near the end of the war — particularly after Major-General Ariel Sharon had succeeded in crossing the Suez Canal and creating a gap in the Egyptian air defence system. Low Israeli Air Force losses, (in air-to-air combat), are generally quoted for air battles that developed after Sharon's crossing.

Thus, it is necessary to analyse the situation existing during the beginning of the Yom Kippur War separately from that existing near its end, before drawing any conclusions.

Thereafter, the Yom Kippur War will be analysed with respect to the following aspects of the use of air power:

1. Egyptian aerial strategy.
2. The Egyptian air defence system.
3. Helicopter operations and helicopter vulnerability.
4. Ground support.
5. Missile effectiveness: Surface-to-air missiles, surface-to-surface missiles, and air-to-surface missiles.
6. Pilot training and aerial combat.
7. Electronic warfare.
8. Precision Guided Munitions and Remotely Piloted Vehicles.
9. Use of satellites for real time intelligence.

Note: The illustrations are *not* to scale. Thus, no deductions can be made regarding relative sizes. For example, the SA-7 Grail, (Figure 5), is much smaller than the SA-6 Gainful, (Figure 4) — although the illustrations show them to be approximately the same size. A better idea of the size of the SA-7 may be obtained from Figure 6.

1. *Aviation Week and Space Technology*, Vol 102, no 10, 10 March 1975, p 14.
2. E. Monroe and A.H. Farrar-Hockley: *The Arab-Israel War, October 1973 Background and Events* (In Adelphi Papers no 111) p 31.
3. C. Herzog: *The War of Atonement* (London, 1975).
4. *Army Journal*, 1 no 324 1 May 1976 (J.V. Vicksne: The Yom Kippur War in retrospect Part 2 — technology), p 32.

FIGURE I

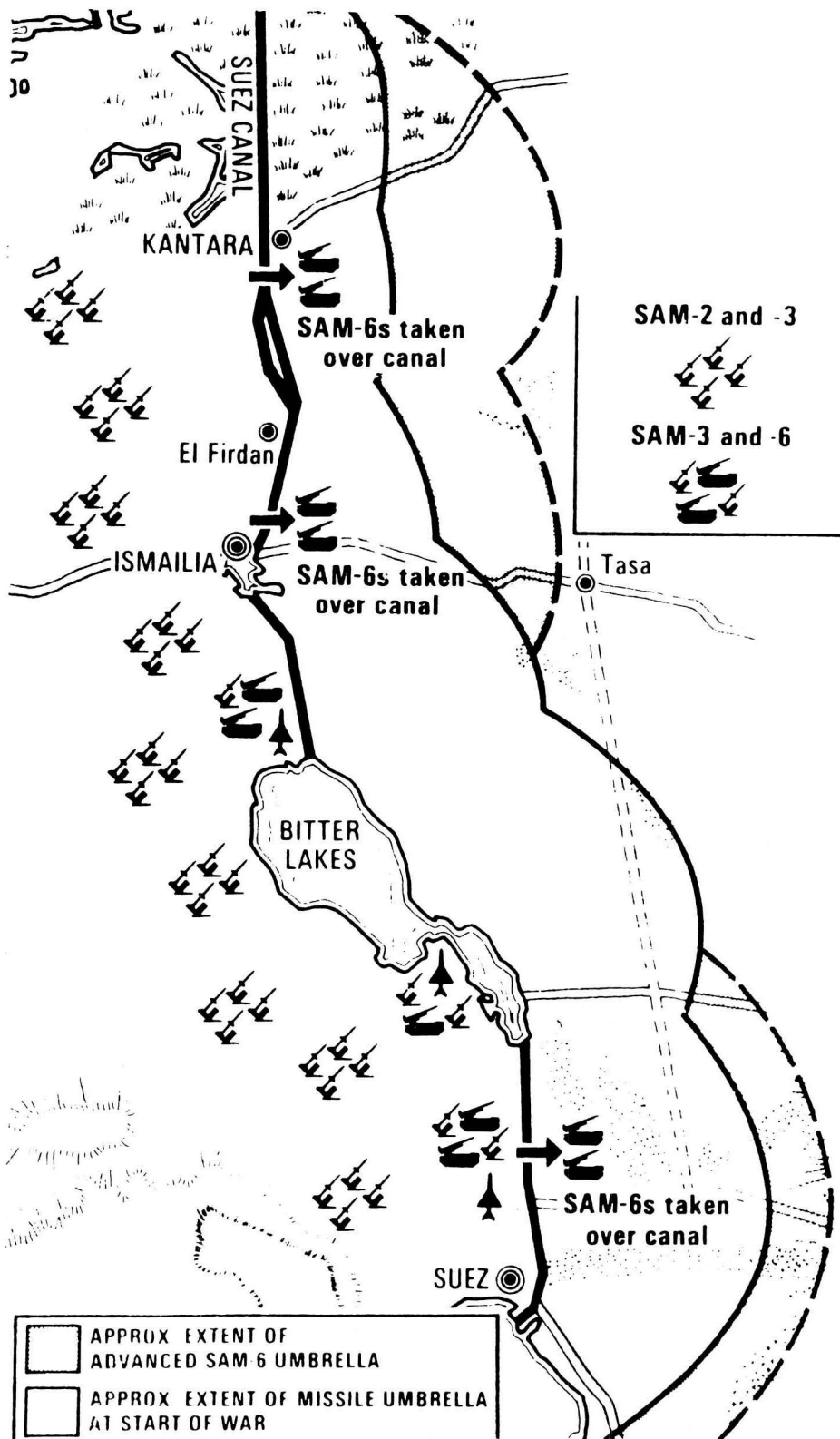


Figure 1: This map gives an idea of the approximate deployment of Egyptian Surface-to-air missiles.

In order to understand these issues in their context, it will be necessary to first review the course of the Yom Kippur War.

The War

The mere fact that we start an attack at all will be the most important element of surprise.

— General Abdel Munim Riad⁵

At 2.15 p.m. on Saturday 6 October 1973, the sinister wail of powerful air raid sirens broke the silence of Yom Kippur, the Day of Atonement the Sabbath of sabbaths, holiest day in the Jewish calendar. Activated at Air Force headquarters, the countrywide alarm had been triggered by the sudden appearance of dozens of aircraft on the early-warning radar screens.⁶

So began the Yom Kippur War for many Israelis. On the East Bank of the Suez Canal, pandemonium reigned. An Egyptian artillery barrage turned the area into an inferno, while powerful *Magirus Deutz* water pumps were used to blast gaps in the huge sand moraines constructed by the Israelis. A mixed aerial task force of over 200 strike aircraft thundered overhead, ranging from *Mi-8* helicopters carrying commandos to *Sukhoi SU-7B* jet fighter bombers. Israelis were sunning themselves at Sharm el Sheik when Egyptian aircraft strafed the nearby Ras Nasrani air field.

Egyptian infantry succeeded in crossing the canal. Stunned Israeli Air Force pilots were shot down as they attempted to aid their beleaguered colleagues on the ground. Eyewitnesses spoke of 'flying electric pylons' — their first encounter with the *SA-6* missile.

On the Syrian front, the situation was critical. Unbelieving Israeli troops manning defensive positions looked on aghast as massive formations of Syrian tanks swept forward, stopping only to fire.⁷ In attempting to provide ground support for the beleaguered ground forces, Israeli Air Force *A-4 Skyhawks* and *F-4 Phantoms* encountered the lethal combination of the *SA-6* missile and *ZSU-23-4* mobile machine cannon. (See Figure 1 for approximate Egyptian missile deployment.)

On the ground, embattled tank commanders found that the legendary Israeli Air Force was powerless to aid them. The air superiority upon which they had come to depend for ground support, was dead. In one of the most desperately fought

sections of the war, the vastly outnumbered Israeli tanks strove to slow the Syrian advance, using 'guerrilla tactics'.⁸

Overhead, the entire strength of the Israeli Air Force was diverted to the Golan heights, in a grim battle to smash the backbone of the Syrian air defence system — ill. At one stage, the situation was so critical, that the commander, 'Tat Aluf' (Brigadier General), Rafael Eytan was judging the course of the battle with a stopwatch.⁹

The Israeli Air Force had eventually succeeded in destroying the bulk of the Syrian air defence system, but what if the Syrians replaced their missile system with Russian aid? Following Rav-Aluf (Luitenant-General) David Elazar's 'break their bones' speech, Israeli aircraft struck at a wide variety of Syrian strategic targets, ostensibly to wreak vengeance for Syrian *PROG* surface-to-surface missiles launched against Israeli targets.¹⁰ In a raid reminiscent of the Second World War Royal Air Force raid against Gestapo headquarters in Copenhagen,¹¹ Israeli Air Force cannon wreaked havoc on military targets right in Damascus. Several delayed action rockets overshot their mark and innocent civilians, including some Indian and Norwegian diplomats, were killed. Although the raids concentrated on strategic targets, a proper strategic offensive was impossible, because it needed a lengthy period of time to work properly, and the time was on the side of the Arabs, not the Israelis.

5. M. Heikel: *The Road to Ramadan* (London, 1976) p 45.

6. E. Luttwak and D. Horowitz: *The Israeli Army* (London, 1975) p 337.

7. *British Army Review*, no 50, August 1975 (Kar: A personal view of the Yom Kippur War), pp 12, 13. 'It (the attack) added some five hundred tanks to the two hundred and forty which had started the battle and to the four hundred and fifty which had been thrown in overnight. But it was too late.'

NOTE: An estimate of the overall attacking tank force, (both Egypt and Syria), is given as 'more than 2 000 tanks,' *National Defence*, vol. 58, no 321, May/June 1974 (C.W. Corddry: *The Yom Kippur War 1973 — Lessons old and new*) p 507, compared with the 3 550 German tanks used initially by Hitler against Russia in 1941 (B.H. Liddell Hart: *History of the Second War* (London, 1970) p 165).

8. E. Luttwak and D. Horowitz: *op cit*, p 374.

NOTE: Rather than launching a single attack, groups of tanks were used to attack the Syrian tanks from the flanks, and then retreat behind cover. These methods proved very successful. This is, however, not to be confused with the 'piecemeal' use of tanks, (that is two tanks per company of infantry, used in a support capacity — used by the British in World War II, during the German invasion of France).

9. E. Luttwak and D. Horowitz: *op cit*: p 375.

10. The Insight Team, *The Yom Kippur War*, (London, 1975) pp 201—203.

11. D. Richards and H. St G. Saunders: *Royal Air Force, 1939—45, Volume 3 The Fight is won* (London, 1954) p 203.

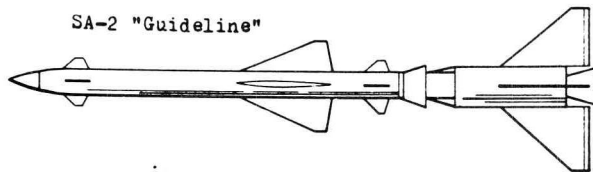


FIGURE 2

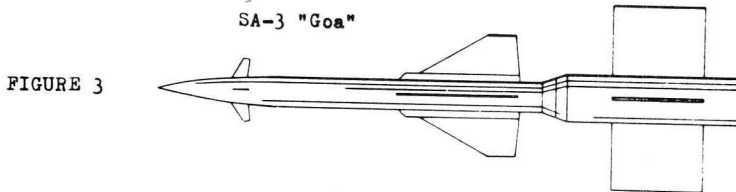


FIGURE 3

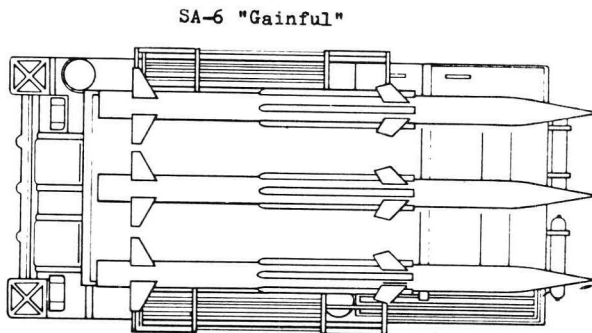
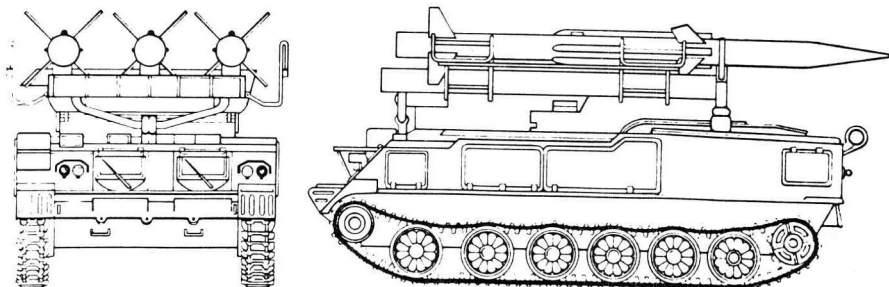


FIGURE 4



SA-7 "Grail"

FIGURE 5

Figures 2, 3, 4 and 5, show the Surface-to-air missiles comprising the Egyptian 'missile umbrella'. As mentioned above, the line drawings are not to scale: the SA-7 Grail is very much smaller than the SA-6 Gainful.

Figure 2: SA-2 Guideline. Used for high-altitude aerial defence. Requires a static installation.

Figure 3: SA-3 Goa. Both the SA-2 'Guideline' and the SA-3 Goa lack the mobility of the SA-6 Gainful (Figure 4).

Figure 4: SA-6 Gainful. Plan, rear and side views. Three missiles are carried on a tracked transporter. The missiles are shown to the rear of the transporter — a configu-

ration adopted for travelling. Gainful SA-6 and SAM-6 are different names for the same missiles.

Figure 5: See also Figure 6. SA-7 Grail. Lightweight, man-portable heat-seeking missile. Figure 6 shows a Soviet conscript ready to operate the missile. The target is located through an optical sight, (arrowed 'A' in figure 6). After the missile has 'locked-on' to its target, a light, (arrowed 'B' in Figure 6), goes on. The missile may then be fired. It will then home automatically on the hot exhaust of an aircraft — without any aid from the person who fired it.

Guideline, Goa, Gainful and Grail are NATO codenames. Strela and Shika are Russian nicknames for the SA-7 and ZSU-23-4 respectively. SA-7, SAM-7 and Strela all refer to the same missile.

While air raids could damage Arab *heavy* industry, they could not destroy an Arab *defence* industry, since most Arab arms came directly from abroad.¹²

What the raids did accomplish (besides crippling blows to Syrian heavy industry), was to ensure that the Syrians were hesitant to divert SAM's (surface-to-air missiles), from the defence of Damascus to replace those destroyed on the Golan heights.

The Sinai

*Experts from Viet Nam will tell you that dodging missiles is no new thing. Israeli pilots will tell you that dodging three or four missiles at the same time is a very new thing. They do not recommend it.*¹³

— Anon

After the Syrian invasion had been stemmed, and Israeli forces were advancing, the Israelis were able to divert resources to the Sinai. After the initial Egyptian success in crossing the canal, the initial Israeli counterattack, using massed armour, had come to grief in a withering hail of anti-tank rockets and anti-tank guided missiles. The Israelis, however, controlled the Giddi, Mitla and Khatmia passes, gateways to Sinai — but with skeleton forces. It is unresolved why the Egyptians did not attempt to seize these passes immediately after crossing the Suez Canal — before the Israelis had fully mobilized.

General Shazli, the Egyptian Chief of Staff, had asked permission to stage helicopter-borne commando raids against Israeli forces occupying the passes. The Egyptian War Minister and commander-in-chief, General Ishmail, refused permission, giving as his reason that he would never oblige his army to operate beyond the protection of its missile umbrella.¹⁴ Those that point to this Arab reluctance to advance beyond 'their missile umbrella,' and use this to draw general conclusions on how 'rigid' and 'limited' an air defence system is, have forgotten the original situation.

How would the light Israeli forces manning the passes have fared against a massive Egyptian attack — immediately after the successful crossing of the canal? Soviet military doctrine emphasizes the offensive, relying on mass, momentum, and sheer numbers to defeat the enemy in the shortest possible time.¹⁵ There is some evidence that the Egyptians had limited aims, and that they were hoping to obtain a position which would require unacceptable Israeli casualties to take.¹⁶

Thus, it should be borne in mind that, although the Egyptian attack on the passes, (when it came), was a failure, a similar attack, planned and executed strictly according to Soviet doctrine, could well have been a spectacular success.

The implications could be that, in a future war situation where Soviet (or Soviet-trained) troops have to cross a lengthy canal (or river) before attacking targets, they can be expected to attack with the utmost vigour and ferocity (as the Egyptians did), and continue their advance with all possible speed and momentum.

Note:

Soviet military doctrine:

'It is rare for opposing (Soviet) forces to halt on or consolidate an objective. Commanders at all levels are under an obligation to continue to press forward in the direction laid down by higher headquarters.'

United States Army Manual¹⁷

Writing in *The Soviet Machine*, on Soviet military doctrine, Christopher Donnelly says: 'Only in the *offensive* (or counter-offensive) lies the way to victory; and in the event of any major war — certainly in the event of war between capitalist and communist states — *the Soviets will aim for complete and total victory* irrespective of whether or not they start the war'. Furthermore, the most important principle given by the same author, (the important idea when theoretical doctrine is to be put into practice), is given as: 'the achievement of *mobility* and maintenance of a high tempo of combat operations.'¹⁸

No mention whatever is made of advancing cautiously to keep casualties low. With these views, it would seem doubtful whether any future Soviet — or Soviet-trained — forces would behave in a similar fashion to the Egyptians, (that is the Egyptians pausing after having crossed the Suez Canal), after having crossed a water obstacle.

12. C. Messenger: *The Blitzkrieg Story* (New York, 1976) pp 224—225.

13. *British Army Review*, no 50, August 1975 (Kar: *op cit*) p 14.

14. The Insight Team: *op cit* p 229.

15. R. Bonds (ed) : *The Soviet War Machine* (London, 1976), p 163.

16. *British Army Review*, no 50, August 1975 (Kar: *op cit*) p 12; *Marine Corps Gazette*, vol 58, no 6, June 1974 (J.E. Knight, jnr: *The October War and after*) p 37;

17. Manual FM 30—102 of the United States Army: *Opposing Forces Europe*, pp 2—17.

18. R. Bonds (ed): *op cit* pp 163—166.

Against SAM 6 (on ground)

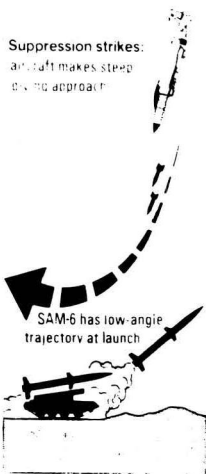
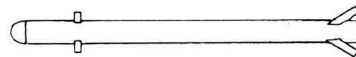


FIGURE 7



SA-7 "Grail"

FIGURE 6

ZSU-23-4 ("Shilka")

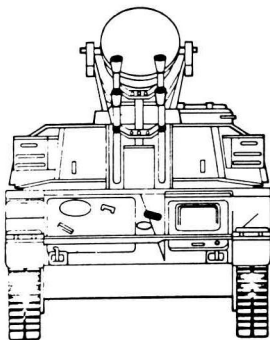


FIGURE 8

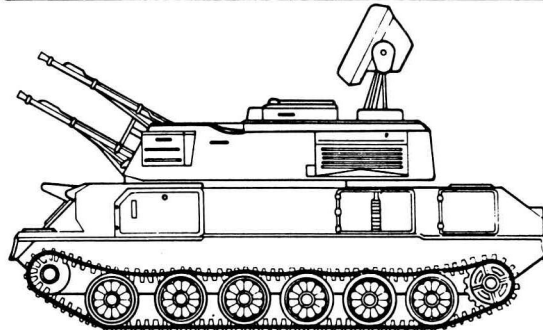
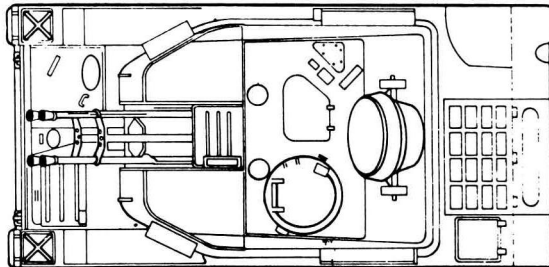


Figure 7. Here a F-4 'Phantom' is attempting to destroy SA-6, (also called SAM-6), launch vehicle. While it would appear from the sketch that the SA-6 vehicle is about to be destroyed by the falling bombs, the steep dive adopted by the Phantom is about to bring it within range

of the ZSU-23-4 Shilka (Figure 8). Thus, while a steep diving attack may be sufficient to neutralise SA-6's, the additional presence of ZSU-23-4's would cause heavy aircraft losses. This explains why the combination of Shika's and Gainful's proved so lethal to Israeli aircraft.

When the Egyptians finally did attack, it was too late. The Israelis had mobilised, and learned from their mistakes. Syria, becoming increasingly alarmed at events on the Golan heights, urged the Egyptians to launch an attack in Sinai. But the Israelis were ready.

Israeli tanks, firing 'hull down', destroyed huge numbers of Egyptian tanks, in one of the largest tank battles since Kursk. But this time it was largely tank versus tank, and not tank versus anti-tank infantry (as had been the case in the first Israeli armoured counterattack in Sinai, which was cut to pieces). The vulnerability of the Soviet infantry combat vehicle, the *BMP*, to tank fire was demonstrated in this battle.¹⁹

The subsequent crossing of the Canal by Aluf (Major-General) Ariel Sharon on the 16 October boldly broke the impasse that existed — the Egyptians had the Canal, but the Israelis held the Passes. Crossing the canal with a small force, and before even having established a proper bridgehead, Sharon ordered his forces to fan out and attack. Attention was given to attacking vehicles and installations comprising the air defence system. While the attack was vital, it was not without humour.²⁰

While Sharon has since been lauded for his crossing of the Suez Canal, the unanswered question remains: how would his small force have fared on the West Bank of the Canal *without* the support of the Israeli Air Force?

Once a gap had been punched in the air defence system, Israeli Air Force aircraft streamed into Egyptian airspace. Huge air battles developed. Writing in *Aviation Week and Space Technology*,

Robert Hotz states: '*Watching gun camera film of these combats, it was not uncommon to see other Mirages and MiG's flash through the camera focus as an Israeli pilot was firing at his specific target dead ahead. Because of the size and character of these actions, it was necessary for pilots to take a quick shot and break away before somebody got on their tail. This made most of the fighting at missile range. Few combats were finished close enough for 20-mm cannon fire.*'²¹ More detailed observations on air combat tactics are discussed later.

Had this incredibly costly²² war continued, further developments in the use of air power might have ensued. But through the intervention of the superpowers, (more specifically the threat of direct Soviet intervention if the Israelis did not stop consolidating their foothold on the West Bank of the Canal), the Yom Kippur War came to an uneasy close.

As stated earlier it has been deemed necessary to evaluate the initial stages of the war separately from the closing stages of the war.

19. *Armor*, vol 85, no 6, November–December 1976 (The Soviet Anti-tank Debate) pp 11–13; Pointers no 2.e.ii: The Yom Kippur War — Doctrine 1 Tanks and Missiles.

20. The Insight Team: *op cit*, p 338.
NOTE: The 'Insight Team' recalls this incident with: 'Two officers, for example, began by hijacking an Egyptian armoured car. Meeting a convoy, they waited for it to pass them, then shot it up from behind and made off. Finding a fuel dump by the road, they drove in and threw some grenades around to fire it. When the armoured car ran low on fuel, they hijacked a Jeep for the return journey.'

21. *Aviation Week and Space Technology*, vol 102, no 10, 10 March 1975 (Kar (pseud): *op cit*), p 16.

22. *Army Journal*, no 324, May 1976 (J.V. Vicksne: *op cit*), p 37.
NOTE: The estimated cost of the war to Israel was 398 million American dollars per day.